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EFFECT OF YOUTUBE INSTRUCTIONAL VIDEO PACKAGE ON SECONDARY SCHOOL STUDENTS' INTEREST IN PHYSICS IN OWERRI EDUCATION ZONE 1

Alachi Sunday
alachi.Sunday@alvanikoku.edu.ng
Physics Education Department,
Alvan Ikoku Federal University of Education, Owerri.

Nkiruka, Treasure Okoye
nc.akabuike@unizik.edu.ng
Science Education Department, Faculty of Education,
Nnamdi Azikiwe University, Awka.
&
Umahi, Nkemakolam A.
nkemumahi@gmail.com
Information and Communication Technology,
Alvan Ikoku Federal University of Education, Owerri.

ABSTRACT

The study investigated the effect of YouTube instructional video package on secondary school students' interest in physics. Three hypotheses guided the study. A quasi-experimental research design specifically non-equivalent pre-test post-test control group design involving intact classes was used for the study. Multi-stage sampling technique done gave a sample size of 118 physics students drawn from 7,703 SS2 physics students in Owerri education zone 1, Imo state of Nigeria. Two groups (experimental and control) were taught physics concepts such as projectile motion, linear momentum, velocity and acceleration using YouTube instructional video package (YIVP) and Lecture method (LM) respectively. The instrument used for data collection was Physics Interest Inventory (PII) adopted from Physics Interest Inventory structure by Chukwunenye (2018). The PII is a 20-item inventory and a five point response type such as 'Like very much, Like, Neither like nor dislike, Dislike and Dislike very much' with numerical values of 5,4,3,2 and 1 respectively. Any item with mean score above 3.00 was regarded as being liked by the students and if below 3.00 was regarded as being disliked by the students. ANCOVA was used to analyze the research hypotheses at 0.05 level of significance. The results revealed that there was a significant difference in the mean interest scores of the two groups of students taught physics concepts using YouTube instructional video package and lecture method and no significant difference in the mean interest scores of male and female students taught physics using YIVP.

Keywords: YouTube; instructional video package; interest; physics.

Introduction

Science and technology have become the bedrock of today's society. It is through science and technology that the country, Nigeria can occupy its right place among the community of nations. Science provides the knowledge base for technology as scientists work with the

Omniscient and Omnipotent of scientific laws to intelligibly explore and comprehend the universe (Opara, 2019). According to Nicholas (2017 Pg;8), all nations of the world are aware of the significant contributions of science and technology as exemplified in the transformation of their education system, economy, improving the living standards of their people. This argument was supported by Giginna (2018) that no nation of the world will attain its zenith in technology and development without giving proper attention to teaching and learning of science. Giginna (2018) further pointed out that the development of a nation depends largely on the level of scientific and technological advancement of that nation. This clearly explains why there has been increase in national interest toward improving teaching and learning of science at all levels of the educational system in Nigeria, especially in physics.

Physics is one of the major natural science subjects that supply the knowledge of the physical environment and matter to the learner. Physics is crucial for effective living in the modern age of science and technology. It serves as one of the most effective tools which science uses to interact or utilize matter to meet human needs (Omeodu, 2019). Physics generates fundamental knowledge needed for the future technological advancement that will continue to drive the economic engine of the world. According to Oche (2017), Physics improves quality of life by providing the basic understanding necessary for developing new instrumentation such as computers. Physics play important role in health, solar system, energy, environment and education and its importance to national development can never be over emphasized. Yet the teaching and learning of Physics has been fraught with challenges which prevent many students from performing well in external examinations (NERDC, 2014).

It is believed that students need to be guided properly through appropriate teaching methods to enhance retention and performance in Physics. Studies such as Njoku (2018) and Ada (2017) revealed that Nigerian teachers persistently use traditional teaching methods, basically, lectures of talk and chalk, in presenting Physics' concepts. In traditional teaching methods, the teacher is the central focus, who talks to passive students. It does not promote meaningful learning nor does it foster critical thinking and students' participation in the teaching and learning process (Njoku, 2018; Ada, 2017). However, emerging trends in education are changing the setting for teaching and learning with new tools such as social media (Peter, 2020). There is a need to make sure that physics is properly taught especially the difficult concepts in physics using innovative methods such as social media aid instructional strategies.

Social media has exploded as a category of online discourse where people create content, share it, bookmark it, and network it at an accelerating rate. Social media is the connections that exist between setups of people. Owing to its ease of use, speed and reachability, social media is fast changing the public discourse in society, setting trends and agenda in industries. Within a decade, the online world has changed dramatically due to the invention of social media. Young men and women now exchange ideas, feelings, personal information, pictures and videos at a truly astonishing rate. Social media is the use of Facebook, Twitter, WhatsApp, 2go, Eskimi, Bado, Skype, My space,We chat, Yahoo messenger, Zoom, Telegram, Google classroom, palm-chat and YouTube for sharing of ideas, sharing of photos and

videos by users. With the outbreak of Covid-19 pandemic, there has been an increase in the use of social media both in the economic and education sector. The Federal Government of Nigeria through the Minister of Education, Mallam Adamu Adamu on Thursday, 16th April 2020 directed all Universities, Polytechnics and Colleges of Education to develop an active virtual learning environment to enable students continue their studies through digital devices. The increased use of social networking websites such as YouTube has become an international phenomenon.

These studies concluded that watching videos on YouTube, therefore, has the capacity of enhancing students' retention, enthusiasm to learn and attitudinal change toward learning Physics. Thus, complementing media use with traditional approaches, such as the lecture method, in teaching and learning is effective for illustrating the relevance of many Physics' concepts which in turn promote students' academic achievement. The YouTube instructional video package as a learning tool provides learners with the extra advantage that after class, they can further explore the topics learned in the classroom. To facilitate students' understanding of Physics' concepts in which students view as difficult, YouTube may fan them interest such as projectile motion, linear momentum, velocity-time graph and acceleration (Effiong, 2021).

Projectile motion is the motion of an object thrown or projected into the air, subject to only the acceleration of gravity. Farinde, Ehimetalor and Dada (2020) defined a projectile as a body that is projected through a gravitational field. Anyakoha (2016) opined that any projectile in flight is doing two things at once; (i) it is flying horizontally with a constant speed, and (ii) it is moving up and down with an acceleration. There are three basic components of projectile motion which are; time of flight, range and maximum height. The evidence from West African Examinations Council Chief Examiners' Report (2022) highlighted students' weaknesses at Senior Secondary School Examination (SSCE) to be failure of students to determine the component of the velocity of a projectile at its maximum height which then affect their achievement in physics including linear momentum.

Linear momentum is the product of its mass and its velocity. Momentum is a vector quantity whose direction is the direction of the velocity. Anyakoha (2016) stated how forces that are related to motion were first discovered by Sir Isaac Newton, who postulated three important laws of motion known as Newton's Laws of Motion. Anyakoha further explained the relationship between impulse and change in momentum. The principle of the conservation of linear momentum can be stated if two or more bodies collide in a closed system, the total momentum before collision is equal to the total momentum after collision. The only force acting in a close of colliding bodies are those due to the collision. The principle of conservation of linear momentum follows from Newton's second and third law of motion. WAEC Chief Examiners' Report 2021 and 2022 posited that students' inability to state the principle of conservation of linear momentum and zero recognition of the relationship between impulse and change in momentum affect their performance at senior secondary school examination, as well as the velocity-time graph.

Velocity-time graph is the plotting of velocity on the vertical axis against time on the horizontal axis. The slope of velocity–time graph represents acceleration as positive slope and deceleration as

negative slope. The uniform velocity is the velocity of a moving body where equal distances are covered in equal time intervals. WAEC Chief Examiners Reports for 2021 and 2022 portrayed that students' poor interpretation and application of the concept of velocity-time graph, a clear demonstration of students' lack of understanding of this fundamental concept in Physics. This concept of velocity is related to acceleration.

Acceleration is the rate of increase in velocity with time. That is, the rate at which velocity changes with time. The concept of deceleration is a negative acceleration. The equations of motion are developing from the concept of acceleration. WAEC Chief Examiners' Report (2022) pointed out that students' weakness is the inability to recall and apply correct formulae to solve physics problems. For example, distinguishing between the general equations of uniformly accelerated linear motion and other equations in mechanics. Thus, proper understanding of the mathematical relationship of acceleration and deceleration was lacking among the Physics' students (WAEC Chief Examiners Report, 2022). The continued evidences of concepts identified by WAEC Chief Examiners Reports for several years gave rise to the choice of these topics and students' interest in the subject.

Interest is a feeling of curiosity or concern about something that makes the attention turn toward it. Students' interest in Physics learning is notably important to their future involvement in the subject. It is useful that the teachers should cultivate students' interest and to make Physics more favourable in the classroom (Djudin, 2018), by adopting better instructional strategy in teaching. In the study of Giginna (2018) on science, technology and society interactions and teaching of Physics, it was discovered that interactive classroom foster students' interest in the learning of Physics as a subject in schools. The studies also pointed out that interest must point learner to the needs of the society. Thus, students' frequent engagement and enthusiasm in social media lead them to source for information of societal interest. The use of YouTube instructional video package may have the potential of arousing and sustaining the interest of boys and girls in the learning of the concepts in Physics. Ali (2019) reported that influence of gender on interest in sciences was not significant. This finding is in support of Akpoghol et al (2016) in which he reported that the experimental and control groups had equal changes in interest in electrochemistry. However, the findings were in disagreement with that of Almasri (2022) who reported that females showed more interest than males in sciences while Alachi (2022) reported that more boys than girls tend to opt for all the basic sciences at SSCE examinations. Therefore, the status of students' interest in physics is inconclusive. Teaching with YouTube instructional video package may contribute effectively to the inconclusive findings on students' interest in their learning. Therefore, research findings have shown contradictory evidence in achievement and interest of students in physics influenced by gender.

Gender refers to the socially constructed characteristics of men and women such as norms, roles, and relationships of sexual nature. Gender disparity in education especially in science courses is a worldwide phenomenon. According to Fatokum and Odagboyi cited in Alachi, Opara and Bardi (2021) noted that some subjects such as Physics, Chemistry and Mathematics are branded masculine while others like Economics,

English Language and Secretarial Studies are branded feminine. Nnorom, Alachi and Anozie in Alachi, Ilo, Alison and Inyama (2022) observed that the consequence of gender stereotyping cut across social, economic, political and educational development especially in the area of science and technology. Studies such as Emeka (2016) showed that the traditional teaching method of Physics is not gender friendly. Almasri (2022) found that e-learning favoured both male and female students in terms of achievement and interest in Physics. These studies evidenced that some teaching methods close the gender gap in science achievement, worthy of note is that both male and female are attracted to digital processes. From the foregoing, gender difference is likely a factor capable of influencing and causing disparity in interest in physics.

Statement of the Problem

Chief Examiners of West African Examination Council highlighted students' weaknesses in mechanics, such as projectile motion, linear momentum, velocity-time graph and acceleration, which invariably affect their overall result at the senior secondary school certificate examination (SSCE). Studies abound which attempted to proffer solutions to students' lack of interest in physics. Most of the studies concurred that the problem identified could be solved by the teachers' choice of appropriate method of teaching. There is need therefore; to search for a better method that will demystify physics. This is to ensure that students get interested in what they are expected to learn in a given lesson for resultant achievement in SSCE. This prompted the quest for an innovative method like the YouTube instructional package. The YouTube instructional package has evolved and been embraced widely in other countries. Educators in those countries believe it works so well in improving interest of all categories of students in science subjects. However, there is little or no evidence in literature to show the utilization of YouTube instructional package in the learning of physics, as regards ascertaining its impacts on students' interest irrespective of gender. Hence, the present study is therefore designed to determine the effect of YouTube instructional package on senior secondary school students' interest in physics.

Purpose of the Study

The main purpose of the study is to investigate the effect of YouTube instructional video package on secondary school students' interest in Physics. Specifically, the study sought to determine;

1. the mean interest scores of students taught Physics using YouTube instructional video package and those taught with lecture method
2. the mean interest scores of male and female students taught Physics using YouTube instructional package
3. the interaction effect of gender and method on the mean interest scores of students in Physics.

Research Hypotheses

The following null hypotheses were tested in this study at 0.05 level of significance:

HO_1: There is no significant difference in the mean interest scores of students taught Physics using YouTube instructional video package and those taught with lecture method.

HO_2: There is no significant difference in the mean interest scores of male and female students taught Physics using

YouTube instructional video package.

HO3: There is no interaction effect of gender and teaching methods on the mean interest scores of students in Physics.

Research Method

A quasi-experimental research design specifically non-equivalent pre-test post-test control group design involving intact classes was used for the study. The study was carried out in Owerri Education zone 1 in Imo state of Nigeria which has six education zones. Population of the study consisted of (7,703) seven thousand, seven hundred and three SS2 physics students selected from (66) sixty-six co-educational schools from different LGAs that make up the education zone. A sample size of (118) one hundred and eighteen physics students was drawn from (4) four co-educational schools I the zone using multi-stage sampling technique (balloting without replacement). The instrument used for data collection was Physics Interest Inventory (PII) adopted from Physics Interest Inventory structured by Chukwunenye (2018). The instrument has a 20-item and a five point response type such as 'Like very much, Like, Neither like nor dislike, Dislike and Dislike very much' with numerical values of 5,4,3,2 and 1 respectively. The reliability of the instrument was established using Cronbach Alpha Method and a reliability co-efficient of 0.79 was obtained.

Experimental Procedure

The procedures that were used for data collection involve the use of pre-test, treatment, post-test for interest. The experimental procedures were described below.

i. Training of research assistants: There was formal introduction by the researcher and the research assistants on the first day of the training. The regular classroom teachers in the experimental schools' work as the research assistants for this study. There were four teachers from the co-educational schools. The training last for two weeks. The training procedure is as follows; the researcher introduces and explained the concept of projectile motion, linear momentum, velocity-time graph and acceleration using YouTube instructional video package to the research assistants. He emphasized the need for the research assistants to encourage the students to participate actively in the learning process. The researcher explained to the research assistants step by step procedure for using YouTube instructional video package and how these strategies can be applied in the classroom environment. The YouTube instructional video package lesson plan developed for the study was introduced to the research assistants, the researcher conducted mock teaching exercise to show them how to practically use YouTube instructional video package in the classroom. However, the teacher in the control school didn't receive any training. They were briefed on the purpose of the research. On the last day of the training exercise, the researcher pleaded with the research assistants to go home with YIVP lesson plan and YouTube video to practice more in their homes. There was both financial and moral encouragement from the researcher.

ii. Pre-test: Pre-test at the initial stage was administered simultaneously to both experimental and control groups before treatment. The research assistants conducted the experiment and also administered the measurement instrument (treatment instrument) to the students. The two groups (experimental group and control

group) were subjected to Physics Interest Inventory (PII) as pre-test.

iii. Treatment: The treatment for all the groups lasted for four (4) weeks since Physics has three (3) periods in a week. The experimental group was exposed to YouTube instructional package which was installed on the school computer using a web browser (Explorer of Firefox). The students in the experimental group were exposed to the YouTube instructional package format under the teacher's supervision long enough for them to be familiar with the navigation button and use the package independently. In addition, they were encouraged to take enough notes that could be useful for them in the post-test. The control group students were exposed to the lecture method on the same content used for the experimental group. This was done by the research assistants. The topics for the instruction were extracted from Physics syllabus for SSII at the time of the study. The control group was taught using the conventional classroom. The classroom contained a chalkboard, chalk, textbook and chart which was used for the instruction.

iv. Post-test: After the treatment, the two groups were exposed to Physics Interest Inventory as the posttest. The lessons on concept of projectile motion, linear momentum, velocity-time graph and acceleration for the exercise was jointly conducted for both the control and experimental groups. PII was administered to the students in the experimental and control groups.

Method of data analysis: The null hypotheses were tested at 0.05 level of significance using Analysis of Covariance (ANCOVA).

Presentation of Results

H_{01}: There is no significant difference in the mean interest scores of students taught Physics using YouTube instructional video package and those taught with lecture method.

Table 4: ANCOVA result on the significant difference in the mean interest scores of experimental and control groups

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	30324.182[a]	4	7581.046	144.248	.000	.759
Intercept	1418.954	1	1418.954	26.999	.000	.129
Pretest	4544.255	1	4544.255	86.466	.000	.321
Method	25103.048	1	25103.048	477.647	.000	.723
Gender	23.813	1	23.813	.453	.502	.002
Method * Gender	3.536	1	3.536	.067	.796	.000
Error	9617.690	183	52.556			
Total	339144.000	188				
Corrected Total	39941.872	187				

a. R Squared = .759 (Adjusted R Squared = .754)

The result on Table 4 also showed that an F-cal of 477.647 with associated probability value of .000 was obtained with respect to the difference in the mean interest scores of students` taught Physics using YouTube Instructional Video Package and those taught with Lecture Method. Since the associated probability (.000) was less than 0.05 level of significance set as the criterion for taking a decision, the null hypothesis (H_{02}) was rejected. It was therefore concluded that there is a significant difference in the mean interest scores of students taught Physics using YouTube Instructional Video Package and those taught with Lecture Method.

H_{02}: There is no significant difference in the mean interest scores of male and female students taught Physics using YouTube instructional video package.

Table 10: ANCOVA result on the significant difference in the mean interest scores of male and female students taught Physics using YouTube instructional video package

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	30324.182[a]	4	7581.046	144.248	.000	.759
Intercept	1418.954	1	1418.954	26.999	.000	.129
Pretest	4544.255	1	4544.255	86.466	.000	.321
Method	25103.048	1	25103.048	477.647	.000	.723
Gender	23.813	1	23.813	.453	.502	.002
Method * Gender	3.536	1	3.536	.067	.796	.000
Error	9617.690	183	52.556			
Total	339144.000	188				
Corrected Total	39941.872	187				

a. R Squared = .759 (Adjusted R Squared = .754)

The result on Table 10 showed that an F-cal of .453 with associated probability value of .502 was obtained with respect to the difference in the mean interest scores of male and female students taught Physics using YouTube Instructional Video Package. Since the associated probability (.502) was greater than 0.05 set as the level of significance and criterion for taking a decision, the null hypothesis (Ho_5) was accepted. Based on this, it was therefore concluded that there is no significant difference in the mean interest scores of male and female students taught Physics using YouTube Instructional Video Package. This result also shows that YouTube Instructional Video Package did not discriminate between male and female students when it comes to its application in

teaching so as to boost students` interest in Physics.

H_{03}: There is no interaction effect of gender and method on the mean interest scores of students in Physics.

Table 14: ANCOVA result on interaction effect of gender and method on the mean interest scores of students in Physics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	30324.182[a]	4	7581.046	144.248	.000	.759
Intercept	1418.954	1	1418.954	26.999	.000	.129
Pretest	4544.255	1	4544.255	86.466	.000	.321
Method	25103.048	1	25103.048	477.647	.000	.723
Gender	23.813	1	23.813	.453	.502	.002
Method * Gender	3.536	1	3.536	.067	.796	.000
Error	9617.690	183	52.556			
Total	339144.000	188				
Corrected Total	39941.872	187				

a. R Squared = .759 (Adjusted R Squared = .754)

The result in Table 14 shows that an F-cal of .067 with associated probability value of .796 was obtained with respect to the interaction effect of gender and method on students` interest scores in Physics. Since the associated probability (.796) was greater than 0.05 level of significance set as the criterion for taking a decision, the null hypothesis (H_{03}) was accepted and that shows no significant interaction effect of gender and method on the mean interest scores of students in Physics.

Summary of Findings

i. There is a significant difference in the mean interest scores of students taught physics using YouTube Instructional Video Package and those taught with Lecture Method.
ii. There was no significant difference in the mean interest scores of male and female students taught Physics using YouTube Instructional Video Package.
iii. There was no significant difference in the interaction effect of gender and teaching methods in Physics.

Discussion of results

The finding revealed that there is a significant difference in the mean interest scores of students taught physics using YouTube instructional video package and those taught with lecture method. This means that the mode of instruction has significantly affected the mean interest score of the students. This finding is in agreement with Uzobuike and Okoli (2020) and Edache-Abah and Dike (2019) whose

findings revealed that YouTube teaching approach improve students' interest in studying science. By implication, the finding of this study shows that YouTube instructional video package could generate curiosity which will lead to interest in physics.

The finding showed that there was no significant difference in the mean interest scores of male and female taught physics using YouTube instructional video package. This is an indication that gender had no influence on the mean interest score of students taught using YouTube instructional video package. Any observed difference in mean interest score is due to chance. This finding is in agreement with Sakkir, Dolla and Ahmad (2020) who observed that YouTube can arouse and motivate interest both in male and female students. The finding of Israel (2020) reveals that there was no significant in the significant difference in the mean interest of male and female students. By implication, YouTube instructional video package do not have significant effect in the mean interest of male and female students in physics.

The finding also shows that there was no significant difference in the interaction effect of gender and method in students' interest in physics. This indicates that gender has a same effect on the physics achievement of control group while gender has the different effect on the physics interest of experimental group. This means that male and female students used for the study have equal interest from the treatment using YouTube instructional video package as the main effect. This finding was in agreement with Nwosu and Ndanwu (2020) and Nkoko (2022) stated that there was no significant interaction effect of teaching method and gender on the mean interest score of students in electronic libraries. The implication of the study, is that there is no significant interaction effect between gender and method on mean interest score of students in physics.

Conclusion

The conclusion of this study is that there is a significant difference in the mean interest scores of students taught physics using YouTube Instructional Video Package and those taught with Lecture Method and that there was no significant difference in the mean interest scores of male and female students taught Physics using YouTube Instructional Video Package. It is concluded that there was no significant difference in the interaction effect of gender and teaching methods in Physics.

Recommendations

Based on the research findings, the following recommendation are made:

1. Use of conventional method of teaching should be de-emphasized in secondary schools as that does not contribute much in students' achievement in physics.
2. The use of instructional videos should be incorporated into Physics instruction on a regular basis.
3. Students should be encouraged to use instructional videos as supplement resource, in addition to traditional classroom instruction.

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