EFFECTS OF VIDEO INSTRUCTIONAL PACKAGE ON SECONDARY SCHOOL STUDENTS' PERFORMANCE IN PHYSICS IN ILORIN

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Abstract
It is essential for science teachers to improve on the strategies employed in impacting knowledge for better performance within and outside the classroom. The introduction of technologies to aid learning is tenable, even among scholars. This study investigated effects of Video Instruction Package integration on students' performance in senior school physics in Ilorin, Nigeria the population were all secondary school students offering physics in Ilorin, Kwara State. Intact classes of two purposively selected co-educational secondary schools form the sample for this study. Force, motion and friction were the topics taught and tested in this study. Three research questions and respective hypotheses were raised and answered in this study using t-Test and ANCOVA as appropriate. Aside the main hypothesis, moderator variables of gender and school type were also examined. This study was a quasi-experiment of non-equivalent and non-randomised control group design with pre-test and post-test. Video Instruction Package was the stimulus instrument and Physics Performance Test (PPT) was used as the instrument to collect data. Significant difference was experienced in the performance of students who were taught physics using Video Instruction Package against those taught without. Gender was not significantly influential in this study. Also, score levels had significant influence on students' performance in physics using Video Instruction Package.

Keywords: Audio-visual, Instruction, Package, Integration, performance

Introduction
Acquiring the rudimentary knowledge of science is vital for everyone in order to appreciate and effectively maximize the resources available around us. Science is a systematically organised body of knowledge. Science may be viewed as a systematic enterprise for building and organizing knowledge in testable forms capable of explaining and making predictions about the universe. Science is a way of investigating and a method of thinking in an attempt to understand nature (Abimbola & Omosewo, 2013). Often times, teaching of science allows the transfer of science knowledge and its applications to learners. Effective teaching of science in Nigeria may afford citizens the ability to solve problems and take responsible and informed decision.

At senior secondary school level, science is majorly classified in to Physics, Chemistry and Biology. Physics is a branch of science that is concerned with the study of the structure of the matter, energy and their interaction in the universe. Physics as a core science subject deals with nature in its abstract forms. The application of the knowledge of physics is central to the development of technologies that have influenced humanity in various fields of human endeavours. Physics continues to stimulate application in Engineering, Medicine, Agriculture and beyond. Medical techniques which include imaging methods (CT-scanning, ultra-sound echo techniques, X-rays, MRI techniques) and diagnostic patient screening techniques are all based on principles of physics (Mohammed, 2016). The understanding

and application of physics has brought the world to a living nucleus (global village). Owing to numerous strides in the application of physics, it becomes imperative to teach physics outside the abstract context. The use of technology to enhance learning has found its place in the 21st century. These technologies are in audio, visual and audio-visual forms (U.S. Department of Education, 2016).

Audio-visual materials possess sound and visual materials. Audio-visual are electronic media consisting of visual and sound component which includes film, slide-tape presentation, corporate conferencing, television programs and many more. Research have shown that human being learns faster and easier with the use of audio-visual processes than by verbal explanations alone. The aim of audio-visual aids is to heighten teacher's ability to present the lesson in an effective, easy and simple way for learners' understanding. It allows learning to be more permanent because learners use more than one sense. Audio-visual aids make nonconcrete ideas to become more concrete to the learners (Kelly, 2017).

Researchers have reported causal difference between students taught using audio visual aid and those taught using contemporary methods. These reports vary from pre-basic, basic, post-basic and secondary levels of education. Ibe and Abamuche (2019) carried out a study on effects of audio-visual technological aids on students' achievement and interest in secondary school biology in Nigeria. It was reported that the learners who were taught using audio-visual technological aids achieved higher scores than the group not exposed to audio-visual material. Similarly, China and Dada (2013) conducted a study on the effects of instructional-video on students' achievements in biology. It was found that the achievement of students in biology improved significantly with the use of electronic instructional medium compared to students taught using conventional method. Gender and students' performance in physics have been widely researched. The position of literature with regards to the use of computer aided instruction and technology use in the classroom and the role of gender in such classroom requires of more attention.

Controversy exist among scholars on the influence of gender on usage and integration of technology in the classroom. While many have reported significance in favour of male students, others have reported no significant difference. However, in physics classroom, Ugwuanyi, (2012) reported that female students performed better than the male counterpart in conceptual understanding of force and motion. Conversely, Chinyere and Omiko (2015) investigated the effect of instructional resources on students' achievement in physics in secondary schools. The study found no significant difference in students' achievement in physics. Okorie and Ezeh (2016) carried out a study on the influence of gender and location on students' achievement in chemical bonding in chemistry. It was revealed that gender also did not significantly influence the performance of students in the study. This position raises the issue of achievement level of students.

Achievement level is the categorization of students into different groups based on their performance i.e. high scorer, medium scorer and low scorer. According to Abdulwahab (2014), score level is a form of categorization such that students are grouped as high, medium, and low scores based on certain measure which stems from students' scores in prescribed test item. Students' performance is usually determined by their scores in line with a given standard or performance of other students in class test or examination. Adeyemo (2010) posited that there exists an effect on students' performance level and problem-solving task in physics. This implies that problem solving task in physics determines to greater extent students' ability in physics. Olorundare (2014) asserted that there is significant difference in the performance of low, medium and high scorers.

Omiola, Enuwa, Awoyemi and Bada (2012) examined the influence of ability levels on the performance of senior secondary school physics students in Ilorin metropolis. In this study, video instructional package was employed against the traditional classroom. The finding from the study showed significant difference in the post-test score of high, medium, and low achiever with the high scorers achieving the highest among the three ability levels. Afolabi and Akinbobola (2009) carried out a study on constructivist problem-based learning technique and the academic achievement of physics students with low performance level in Nigerian Secondary Schools. It was reported that the physics students with low performance level taught with problem-based learning technique performed significantly better than those taught with conventional learning method. It may be safe to posit that students of varying ability levels perform differently depending on the type and method of instruction.

Statement of the Problem
Scholars have posited that integration of technology in the classroom for teaching aids learning. The kind of technology to be integrated depends on the technological advancement of a country. While government of nations have struggled to make available up to date tech in the classroom. Communities and schools can only make available the technology at their disposal. However, countries have experimented robots as teachers in the classroom owing to their advancement in technology and the willingness of such authorities to implement the stride, others have challenges of electricity to power computers to aid instruction. The performance of students in physics has remained inconsistent and unsatisfactory over the years especially in Kwara State. The need to improve students' performance becomes imperative. As established in the literature, technology is helping to advance the various modes of instruction as well as stimulating the attention of learners for better performance and retention. This study therefore investigated the effects of video instructional package on senior school students' performance in physics in Ilorin, Nigeria.

Research Questions
The following research questions were raised in this study:
(i)   What is the effect video instructional package on students' performance in Physics?
(ii)   Does gender influence the performance of students in physics when taught video instructional package?
(iii)   Will difference exist in the performance of high, medium and low scorers when taught physics using video instructional package?

Research Hypotheses
The following hypotheses were formulated to guide the study;
H_{01}:   There is no significant difference in the performance of students taught physics using video instructional package and those taught conventionally.
H_{02}:   Gender will not significantly influence the performance of students taught physics using video instructional package.
H_{03}:   Score levels will not significantly influence the performance of students taught physics using video instructional package.

Methodology
This study is a quasi-experiment of non-equivalent and non-randomised control group design. The population were all secondary school students in class one (SS1) offering physics in Ilorin, Nigeria. SSI students were considered appropriate for this study because they possess limited experience in physics classroom, therefore, will not have a stuck/stereotypical mind-set about their previous experience of the physics classroom.

Force, Friction and Motion concepts were considered appropriate in this study because these concepts form the introductory aspect of the SS1 physics curriculum. Purposive sampling technique was employed to select two co- educational secondary schools. The participating schools were required to have access to a functioning computer laboratory and the school must be willing to participate in this study.

A total of one hundred and twelve (112) students participated in the study. Experimental group had 77 students while the control group had thirty-five (35) students. There were forty-eight female and twenty-nine male students in the experimental group. Experimental group were taught with the aid of a video instructional package on force, motion, and friction. Intact classes of experimental group and a control group formed the respondents for this study. Score levels of students were determined through students' performance from the previous term.

The experimental group and the control group were exposed to Physics Performance Test (PPT) which served as pre-test and thus preliminary data were collected from both groups. Afterwards the experimental group were exposed to the treatment (video instructional package) and control group were also taught using the conventional method for the period of three weeks as prescribed in the syllabus. video instructional package was played intermittently to explain the concepts in the topics and sub-topics during the lesson to the experimental group, while the control group was taught with conventional method. The Physics Performance Test (PPT) consisted of twenty-four multiple choice questions which served as instrument for post test data collection.

Results

Research Question One: What is the effect of video instructional package on students' performance in Physics?

Table 1 presents the analysis of the scores of students exposed to video instructional package and those taught with conventional method.

Table 1: Mean and Standard deviation of students in Experimental and Control Group

Treatment Group	Pretest		Post-test		Gain Score
	Mean	SD	Mean	SD	Mean
Experimental	47.02	11.14	64.05	8.93	17.03
Control	45.95	10.77	59.05	8.78	13.10

Evident from tale one, students' post-test scores for both control and experimental groups improved with experimental having benefitted most.

Research Hypothesis One: There is no significant difference in the performance of the students taught using video instructional package and those taught with conventional method.

Table 2: t-test analysis of students' scores taught using video clips and those taught with conventional method

Treatment	N	Mean	SD	df	t-value	Sig (2-tailed
Experimental	77	64.05	8.93			
				113	2.71	0.01
Control	35	59.05	8.78			

p<0.05

Table 2 reveals that the calculated t value is 2.71 computed at 2, 113 degrees of freedom. Since the p-value 0.01 is less than 0.05 level of significance. It means that there was significant difference in the performance of students who were taught physics using video instructional package and those who were taught with conventional method. Therefore, hypothesis 1 was rejected. This implies that there was an improvement in students' performance in physics when taught with video instructional package.

Research Question Two: What is the influence of video instructional package on students' performance in physics based on gender?

From table 3, the mean gain score of female students is higher than that of male students.

Table 3: Analysis of male and female students' scores taught physics with video instructional package using descriptive statistics

Variable	Pretest		Post-test		Gain Score
Gender	Mean	SD	Mean	SD	Mean
Male	52.16	12.58	67.96	13.13	15.80
Female	48.44	9.67	64.76	11.21	16.32

From the mean score of male and female students, male students out-performed their female counterpart in both the pre-test and post-test scores as shown on table 3.

Research Hypothesis Two: There is no significant difference in the performance of students based on gender when taught using video instructional package.

Table 4: t-test analysis of male and female students' scores taught physics with video clips

Gender	N	Mean	SD	df	t-value	Sig (2-tailed
Male	29	67.96	13.13			
				76	1.14	0.26
Female	48	64.76	11.21			

p>0.05

There was no significant difference in the performance of students based on gender when taught using video clips as shown on Table 4. This is due to the fact that the p-value .26 is greater than 0.05 significant level, hence hypothesis 2 is not rejected. This implies that gender of students had no influence on the performance of physics students when taught using video instructional package.

Research Question Three: What is the difference in the performance of high, medium and low scorers when taught physics using video instructional package?

Table 5: Analysis of students' scores based on score level using descriptive statistics

Variable	Pretest		Post-test		Gain Score
Score levels	Mean	SD	Mean	SD	Mean
Low	32.61	6.12	56.46	8.49	23.85
Medium	50.40	8.98	61.98	7.24	11.58
High	60.46	11.19	78.67	8.10	18.21

Students' performance improved significantly when taught using video instructional package with low scorers benefitting most with 23.85 mean gain score, followed by high scorers with mean gain score of 18.21, while medium scorers benefitting least with mean gain score of 11.58, though all (low, medium & high) levels benefitted.

Research Hypothesis Three: There is no significant difference in the performance of the students based on score level when taught using video instructional package.

Table 6: ANCOVA Results for Students Score Levels when Exposed to video clips

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	6808.442[a]	3	2269.481	40.326	.000	.624
Intercept	6488.840	1	6488.840	115.299	.000	.612
Pretest	459.220	1	459.220	8.160	.006	.101
Score levels	2845.181	2	1422.590	25.278	.000	.409
Error	4108.315	73	56.278			
Total	345954.861	77				
Corrected Total	10916.757	77				

a. R Squared = .624 (Adjusted R Squared = .608)

Table 6 displays the result of Analysis of Covariance (ANCOVA) for the performance of students on the basis of their score levels. It was revealed that there was a significant difference in the performance of students when taught using video clips. Evident from $F_{(2,77)}$= 25.278; p = .00, which implies significant difference. This means that video clips improved students' performance as all the score levels benefitted in video clips method

Discussion

The result of the finding revealed that there was a significant effect of the treatment in the post test scores of the students exposed to Video Instruction Package. Consequently, the use of Video Instruction Package proved to be effective in teaching and learning of physics among senior secondary school students. This study tallies with the works of Ibe and Abamuche (2019) and China and Dada (2013) who concluded that the use of Video Instruction Package improved students' academic performance.

The position of this study is that gender had no influence on students' ability to utilize Video Instruction Package for learning. This is in line with the work of Chinyere and Omiko (2015), and contrary to the work of Okorie and Ezeh (2016) who posited that gender significantly influence students' performance.

In this study, low scorers benefitted most followed by high scorers while medium scorers benefitted the least from the statistical analysis. This is line with the studies of Omiola, Enuwa, Awoyemi and Bada (2012); Afolabi and Akinbobola (2009); Adeyemo (2010) whom all reported significant influence of score levels students' performance in physics.

Conclusion

This study concluded that;

(i)   The integration of Video Instruction Package improved secondary school students' performance in physics.

(ii)   Gender did not influence the integration of Video Instruction Package as well as the performance of students in in this study.

(iii)   Since low scorers benefitted the most in this study, so, the method employed in this study is most advisable for students who are below average

Recommendations

The following recommendations are made based on the findings:

(i)   Teachers should expose students to Video Instruction Packages for teaching physics at secondary schools in Ilorin, Kwara state.

(ii)   Male and female students should be encouraged to use video instructional package to enhance students' performance.

(iii)   More attention should be given to medium scorers in order to improve their performance

References

Abimbola I. O., & Omosewo E. O. (2013) *History of science for decree students*. Oyinola Printing works.

Adeyemo, S. A. (2010A). Teaching /learning physics in Nigerian secondary schools. The curriculum transformation, issues, problems and prospects. *International Journal of Educational Research and Technology,1*(1), 99-111.

Adeyemo, S. A. (2010B). Students' ability level and their competence in   problem-solving task in physics. *International Journal of Educational Research and Technology, 1*(2), 35-47.

Afolabi, F., & Akinbobola, A. O. (2009). Constructivist problem based learning technique and the academic achievement of physics students with low ability level in Nigerian secondary schools. *Eurasian Journal of Physics and Chemistry Education, 1*(1), 45-51.

China N. C., & Dada, M. G. (2013). Effects of developed electronics instructional medium on students' achievement in Biology. *Journal of Education and Learning, 2*(2),1-7.

Ibe, E., & Abamuche, J. (2019*). Effects of audio-visual and technological aids on students' achievements and interest in secondary school biology in Nigeria*. Heliyon published online 2019 June 5(6).

Mohammed, R. E. (2016). *Effects of virtual and physical laboratories on secondary school students' academic achievement in practical physics in Ilorin, Nigeria*. Unpublished Ph. D Thesis in the Department of Science Education University of Ilorin, Nigeria

Omiola, M. A., Enuwa M. R., Awoyemi, S. O., & Bada, A. A. (2012). Effect of developed video instructional package on the performance of senior secondary school physics students in Ilorin metropolis. *British Journal of Science, 6*(1), 45-54.

U.S. Department of Education (2016). *Federal funding for educational technology and how it is used in the classroom: A summary of findings from the integrated studies of educational technology*. Retrieved from http://www.ed.gov/rschstat/eval/tech/iset/summary2003.pdf