



Hands-on, Eyes-on: Enhancement of Nigerian Senior Secondary School Physics Through Observational Learning

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ABSTRACT

Physics is an aspect of science that is essential for the scientific development of any nation, but the performance of students in the subject remains a concern for physics educators. Observational learning is one way of enhancing performance. This study investigates the effects of this type of learning as reinforcement to enhance Nigerian students' performance in physics. The investigation adopted the pre-test post-test randomized control group quasi-experimental design involving 89 senior school students randomly selected from two schools in Ondo, Nigeria. The instrument, the Physics Achievement Test in Energy Quantization (PATEQ), consisting of 19 multiple choice questions, was used to obtain the data. PATEQ was validated by three science education experts and a reliability coefficient of 0.72 was achieved through Kuder-Richardson Formula 21. The experimental and control groups were taught energy quantization using observational and conventional teaching methods respectively. The findings show that observational learning has a significant effect on physics students' achievement. It is concluded that such learning should be used to reinforce the teaching of physics in order to improve Nigerian students' grades in the subject.

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1. INTRODUCTION

Introduction to transition needs in special education

Physics, an important aspect of science, plays a significant role in the development of any nation. Omosewo (2012) argues that the study of physics is crucial to the development of a nation such as Nigeria. The subject, a crucial part of physical science, concerns the study of matter and energy and their interaction (Omosewo, 2012). It is referred to as the bedrock of science and technology as it provides many of the tools on which scientific and technological developments depend (Akinbobola & Bada, 2019). The knowledge of physics has also assisted in making life more meaningful and easier for humans. Its importance has been stressed in different fora, especially in the developing nations of Africa, including Nigeria. Its development is currently being seen in the world of Information Communication Technology (ICT) and it has made the sending and receiving of information easy (Bada & Akinbobola, 2020). This has ensured the continuity of activities even in the grips of the lockdown currently being experienced as a result of the coronavirus (Covid-19) pandemic ravaging most countries of the world.

The objectives of the Nigerian senior secondary school physics curriculum aim to ensure the acquisition of essential skills for use in enhancing the scientific development of the nation (FRN, 2013). This objective is similar to the that currently seen in developed countries such the US and Germany. Despite the notable achievements already made by most developed nations, the development and improvement of physics have constantly been given high priority. This indicates the major role physics plays in ensuring the scientific improvement of countries. The content of the Nigerian senior secondary school physics curriculum is laid out under six themes. This is to ensure suitable teaching and learning of subjects so that the nation can realise its set objectives; for example, through the teaching of physics.

Table 1. Nigerian Senior Secondary School Physics Curriculum by Theme

Theme	Content
Theme 1	Interaction of matter, space and time
Theme 2	Conservation principles
Theme 3	Wave- motion without material transfer
Theme 4	Fields at rest and in motion
Theme 5	Energy quantization and duality of motion
Theme 6	Physics in technology

Table 1 shows the content of the senior secondary school physics curriculum arranged under six themes. Nigerian physics students are required to study and comprehend all the topics under these themes in order to excel in their school certificate examinations, as organised by the West African Examination Council (WAEC) and National Examinations Councils (NECO). The performance of senior secondary school physics students in these examinations is not yet at a satisfactory level for physics teachers and science educators. The factors identified which affect students' performance in physics are similar to the those identified in other nations worldwide, especially in Africa.

Researchers have identified factors such as non-coverage of the syllabus (Erinosho, 2013); poor teaching methods (Ilhami, 2018; Uwizeyimana, Yadav, Musengimana & Umamahoro, 2018); little time for science; few hands-on activities; teachers with insufficient knowledge of the subject matter; and students with little interest in science (Bull, Gilbert, Barwick, Hipkins & Baker, 2010; Vannier, 2012; Cooper, Cowie & Jones, 2010), together with the relative difficulty experienced by practising teachers in some topics (Bada, Akinbobola & Damoroem, 2018) to be responsible for the reasons why the performance of students in senior secondary school physics remains inadequate. For students to perform well in the subject, all parties concerned need to make an effort to overcome the challenges identified.

Table 2 shows the performance of physics students in the West African Examinations Council (WAEC) certificate examinations between 2016 and 2019. It reveals that the number of students who were successful increased over the years; however, their performance still leaves room for improvement. Even though the performance of students increased during succeeding years, it is yet to reach a perfect stage of a hundred percent pass. The table shows that students performed best in 2018, with a 78.49% pass rate, while the worst performance was recorded in 2017, with 54.45% of students passing. Despite the relatively good performance in physics, educators, especially those in the field of physics, are still concerned about the remaining students who achieved below pass marks in their external performance.

Table 2. Students' Performance in May/June WAEC Certificate Examinations

Year	Number of students Enrolled	Total Credit Pass (A1-C6)	% Credit Pass (A1-C6)	Total Below Pass (D7-F9)	% Below Pass (D7-F9)
2016	705,125	415,655	58.95	289,470	41.05
2017	377,851	20,5757	54.45	172,094	45.55
2018	728,354	571,687	78.49	156,667	21.51
2019	725,853	565,746	77.94	160,107	22.06

Several researchers have conducted studies on the use of modern teaching methods or instructional strategies and how they have enhanced the performance of students in physics, but all of these methods/instructional strategies had little or no positive effect on students' performance in secondary school physics. Foreign researchers have investigated the use of modern instructional strategies, but few studies have demonstrated positive effects on the performance of students in physics (Hussain, Ahmed, Mubeen & Tariq, 2011; Husain, Azeem & Skatoor, 2011; Njoroge, Changeiwo, & Ndirangu, 2014; Garuma & Tesfaye, 2012). Researchers in Nigeria have also investigated the effects of some modern instructional strategies on secondary school students' performance in physics. They reveal that analogy instructional strategy and cognitive style (Okoronka & Wada, 2014); animation-based cam-studio (Adegbija & Falode, 2014); laboratory-based instructional intervention (Ojediran, Oludipe, & Ehindero, 2014); computer assisted instruction (Suleiman, Hussain, & Igbal, 2017; Adolphus, & Omeodu, 2020); the mind mapping teaching method (Bada & Afolabi, 2020); and the experiential teaching strategy (Bada & Akinbobola, 2020) are some of the methods whose effects have been investigated in relation to senior secondary school students' performance in physics. Another modern teaching or instructional method that is yet to be fully investigated is the use of observational learning and its

effect on such performance. There are few studies on the effect of observational learning on students' performance in senior secondary school physics in Ondo, Nigeria.

Observational learning (OL) is a method that has the capacity to improve students' achievement in physics. It is based on the process of learning through watching others, retaining the information, and later reproducing the observed behaviour (Cherry, 2019). It relies on the information obtained from observing events and phenomena and emphasises how the hands-on experience reinforcement of punishment brings about effective learning. Also known as the shaping model, OL plays an important role in the process of socialisation. It is the process of learning by watching the behaviour of others followed by memorization and mimicking. Learning occurs when observers change their behaviour after viewing the behaviour of a model, and can be viewed positively or negatively. The positive view is known as vicarious reinforcement, while the negative is referred as the vicarious punishment of model behaviour (Stone, 2017). The foundation of this paper is in the vicarious reinforcement form of OL, and its effect on senior secondary school students' performance in physics investigated.

The researchers were also interested in investigating the effects of OL on students' retention of physics concepts, which can be used to demonstrate that learning has been maintained over a period of time (Akinbobola, 2006) and can be reproduced later. Bada and Afolabi (2020) argue that retention in physics can only be assessed after adequate teaching and learning has taken place, while Ndem and Ubana (2013) explain that retention is the ability to recall thought after a passage of time. This is a crucial objective of the cognitive domain of learning as a particular level of objectives in the domain emphasises the ability to retain and recall concepts learnt after a period of time.

The performance of Nigerian senior secondary school physics students is yet to reach a hundred percent credit pass level despite concerted efforts by researchers, especially physics educators. The high level of difficulty experienced by senior secondary school students might be responsible for this situation. Bada, Akinbobola and Damoroem (2018) also report difficulties experienced by physics teachers related Theme V (Energy Quantization and Duality of Motion) of the Nigerian senior secondary school physics curriculum. This might also be responsible for the relative poor performance in the subject.

Different studies both within and outside the nation have identified several factors which could impede the performance of students. These include poor attitudes (Ogunleye & Babajide, 2011); a lack of qualified teachers and poor teaching methods (Bada & Akinbobola, 2017); the use of traditional teaching methods; and the lack of appropriate teaching materials (Uwizeyimana, Yadav, Musengimana & Umamahoro, 2018). Out of these factors, the methods used by teachers play a crucial role in the achievement of classroom objectives (Uwizeyimana, Yadav, Musengimana & Umamahoro, 2018). Modern methods for teaching physics have been stressed to be key in achieving set objectives, but no studies have investigated the effect of the observational learning method on the theme of energy quantization and duality of motion. This work therefore fills this gap in its empirical study of how Nigerian senior secondary school physics performance can be enhanced using OL.

This investigation adopted Bandura's (1986) social learning theory, which stresses the importance of observation and modelling of behaviour, attitudes and emotional reactions. The theory identifies four processes that influence observational learning:

Attention: The theory expects observers to pay attention to what is happening around their environment. The characteristics of the models designed influence the process of attention.

Retention: The theory encourages observers to not only recognise observed behavior, but also to remember the behaviour later. This process expects the observer to code information in a way that it can be easily remembered.

Reproduction: The theory encourages observers to be able to produce acts observed, which may involve skills they cannot replicate immediately.

Motivation: The theory believes that observers will only perform an act if they are well motivated. This essence of reinforcement or punishment determines if the observed skill will be put into practice or not.

OL impacts learning in three ways: the curriculum, instruction and assessment. The curriculum aspect stresses the importance of what should be observed and experienced, then models the behaviour, that bringing about positive reinforcement. Instruction encourages educators to engage in collaboration learning because the bulk of learning occurs within the social and environmental context. Assessment relies on the ability of educators to provide incentives and support the environment in which the behaviour is learnt. Bandura (1986) postulated three type of models that can be used in observational learning, namely the live model, verbal model and

symbolic model. This study adopted the verbal model of OL because it does not perform the behaviour, but instead explains and describes it.

In his social learning theory, Bandura (1986) stresses the importance of observation and learning. Observational learning involves watching others, retaining the information and reproducing what has been observed over time. Zimmerman and Kitsantas (2002) conducted a study on the acquisition of writing, revision and self-regulatory skills through observation and emulation. This involved 72 college students from a Southeastern university. Their results revealed that social feedback assisted learners in all the modeling groups in acquiring writing and self-regulatory skills during enactive performance. This finding is in line with that of Braaksma, Rijlaarsdam, Bergh and Hout-Wolters (2006), who found that students who were assigned with deep questions performed significantly better than those who were given standard instruction. Their study involved six students in their ninth grade at three secondary schools in the Netherlands, with students attending one individual two hour session. In the study conducted by Craig et al. (2008) on the effectiveness of the vicarious learning environment, which is a type of OL with deep questions, in the study of the the human circulatory system, the investigation revealed that students who were assigned with deep questions performed significantly better than those students who received standard instruction Craig et al. studied eighth grade students using two standard teaching conditions: a computerised monologue condition in which a virtual tutor delivered content; and a deep question condition, in which a virtual tutor delivered the content, but preceded by deep questions handled by virtual students. This confirms that OL can have a positive effect on students' performance.

Groenendijk, Janssen, Rijlaarsdam and Bergh (2011) conducted research to establish the effect of observational learning on students' performance, processes and motivation in two creative domains. They studied 131 Dutch students in their 10th grade, which involved two experimental groups randomly assigned to visual learning and verbal art groups. Their results show that OL had a positive effect on the creative process in the verbal domain. Craig, Gholson, Brittingham, Williams and Shubeck (2012) investigated the effectiveness of vicarious learning using deep questions and self-explanation in high school physics classrooms. They made use of a 12 minute video explaining Newtonian physics as the intervention. The findings from their study show that students taught physics through observation of deep questions and self-explanation performed better than those students who observed deep questions alone without any observation. Achilike, Mgboro and Agasiere (2018) investigated the relationship between social networking sites and observational learning among senior secondary students in Mbaitoli, finding a relationship between social networking sites and the observational learning of senior secondary school students. 560 students were involved in the study, whose findings revealed that social networking sites have a strong positive relationship with observational learning.

Regarding the retention of physics students, Bada and Afolabi (2020) discovered that treatment had a significant effect on their performance. In their study on the effect of the mind mapping teaching method (MMTM) on student's retention in physics in technology, Bada and Afolabi (2020) found that its use assisted students to retain concepts learnt better. In addition, Akinbobola and Bada (2018) found significant differences in the retention of physics students taught the concept of optics in Ondo, Nigeria. Their study investigated the effect of three methods of teaching (case-based, collaborative, and expository) on senior secondary school physics students and revealed that the treatment had significant effect on their retention scores. Oluwatosin and Bello (2014), however, disagreed with the findings of Bada and Afolabi (2020) and Akinbobola and Bada (2018). They found that treatment (the mastery learning and mind mapping approaches) did not have a significant effect on physics students' retention of concepts learnt, but that they were able to retain concepts better when taught using conventional methods.

The reviewed literature reveals that the use of OL can enhance students' performance in physics, especially in the area of Newtonian physics (Craig, Gholson, Brittingham, Williams, Shubeck, 2012). However, there is little or no evidence in the literature of the effectiveness of OL on the achievement of Nigerian secondary school students in the content energy quantization field of physics as the few studies on observational learning were mostly conducted by foreign researchers (Zimmerman & Kitsantas, 2002; Braaksma, Rijlaarsdam, Bergh, & Hout-Wolters, 2006; Craig et al., 2008; Groenendijk et al, 2011; Achilike, Mgboro & Agasiere, 2018). This investigation therefore provides an empirical study of the effectiveness of observational learning on senior secondary school physics students learning of energy quantization. The study has the following objectives. It aims to establish the effect of the OL method on students' (i) achievement in energy quantization, and (ii) retention in energy quantization. Two research questions were posed to guide the study: (1) What is the effect of the observational

learning method on students' achievement in energy quantization? and (2) What is the effect of the observational learning method on students' retention in energy quantization? In addition, two null research hypotheses were tested for acceptance or otherwise at the 0.05 significance level:

H⁰¹: There is no significant difference in the achievement of students taught energy quantization using the observational learning method and those taught using conventional teaching methods.

H⁰²: There is no significant difference in the retention of students taught energy quantization using the observational learning method and those taught using conventional teaching methods.

2. MATERIALS AND METHODS

This section provides information on the research design, participants, research instruments and data analysis.

RESEARCH DESIGN

Quasi-experimental research was adopted for the study, which is a very useful method for answering specific scientific questions (Fokides & Papoutsis, 2020). The investigation used one experimental and one control group to obtain data. The two classes were used in this study, which lasted for seven weeks.

PARTICIPANTS

The study took place during the 2019/2020 academic session, and involved 89 senior secondary two (SS2) students selected from two schools in Ondo, Nigeria, which is one of the six states located in the southwestern part of Nigeria. The Ministry of Education in Ondo State reported that student's performance in senior school certificate examinations in the five subjects of English Language, Mathematics, Physics, Chemistry and Biology was low (MoE, Ondo State, 2001). This study concentrates on the performance of physics students. Table 3 shows the representation of the participants in the two groups (observational learning and conventional teaching methods). One intact class was selected from each of the two schools. 46.1% of the participants who took part in this research were taught energy quantization using the observational learning method, while 53.9% were taught using conventional teaching methods.

Table 3. Representation of the Participants According to Group

Groups	N	%
Observational Learning Method (OLM)	41	46.1
Conventional Teaching Method (CTM)	48	53.9
Total	89	100.00

Table 4. Pre-test Scores of Students in the Experimental and Control Groups

Group	Group Statistics	Pre-test	Mean Difference
OLM	N	41	0.31
	Mean	5.90	
	Std	2.89	
CTM	N	48	0.31
	Mean	6.21	
	Std	3.39	

OLM = Observational Learning Method CTM = Conventional Teaching Method

Table 5. t-test Analysis of Students' Pre-test Scores in the Experimental and Control Groups

Groups	N	Mean	Std.	Df	T	Sig.	Remark
EG	41	5.90	2.89	87	0.46	0.67	NS
CG	48	6.21	3.39				

P < 0.05; EG = Experimental Group, CG = Control Group

The homogeneity of the two groups was determined by investigating if there was any difference in their pre-test scores. Table 4 shows these scores for the students in the two groups. The mean score of those in the experimental group before treatment was 5.90, while that of those in the control group was 6.21. The mean difference between the experimental and control group was therefore 0.31. In order to establish if the difference between the two group was statistically significant, t-test analysis of the pre-test mean scores of the two groups

was conducted. Since the calculated value of 0.67 is greater than the alpha value of 0.05, it implies that there is no significant difference between the pre-test scores of the students in the two groups. This means that the two groups (experimental and control) were equivalent in their knowledge of energy quantization before the experiment was conducted (Table 5)

RESEARCH INSTRUMENT

The Physics Achievement Test on Energy Quantization (PATEQ) was used to obtain data for the study. This consists of 19 multiple choice questions on energy quantization as covered in the Nigerian Senior Secondary School Physics Curriculum. The test was given to three experts in science education for validation in terms of content and face validity and pilot tested on 52 senior secondary school students in a non-participating school. A discrimination index of 0.56 was obtained, with a reliability coefficient of 0.72 obtained using Kuder Richardson. An intact class was randomly selected from each of the two schools used in the study.

DATA COLLECTION

One class was used as the experimental group and the other as the control group. The latter was taught the concepts of energy quantization using the conventional teaching method, while the former was taught the same content using the conventional teaching method and the observational learning method as reinforcement. We designed a verbal instructional model which was used for instruction in the experimental group. The control group was taught the same content using the conventional instructional package. PATEQ was used in the pre-test, post-test and retention test, but reshuffled before administration in each of the cases. We used the physics teachers in the schools after adequate consent had been received from them to act as research assistants. The study lasted for a period of seven weeks and it was conducted in five stages:

Stage 1 (1 week): We prepared the verbal instructional model used for teaching the experimental group while the lesson instructional package used to teach the control group was also prepared.

Stage 2 (1 week): We trained the experimental group teacher on the use of the observational learning method, particularly in relation to the use of the verbal instructional model. Pre-test administration of PATEQ was carried out on the experimental and control groups. The test was marked, graded and recorded by the research assistants using the marking guide already prepared.

Stage 3 (2 weeks): The teaching of the two groups on the concept of energy quantization was undertaken. The control group was taught using the conventional teaching method, while the experimental group was also taught using the conventional teaching method together with the observational learning method, with the carefully designed verbal instruction model. Each of the groups had four lessons. We monitored the process to ensure conformity with the lesson package designed.

Stage 4 (1 week): The post-test administration of PATEQ was administered on the experimental and control groups by the research assistants without informing the students. The test was marked, graded and recorded using the already prepared marking guide.

Stage 5 (2 weeks): The PATEQ retention test was administered on the two groups two weeks after the post-test administration, without informing the students in advance. The test was marked, graded and recorded using the marking guide already prepared.

DATA ANALYSIS

We analysed the data obtained from the two tests (post-test and retention test) taken by the two groups using descriptive and inferential statistics. The data in the form of scores (post-test and retention test) from the two groups were analysed using the Statistical Package for Social Science version 21.0; the two research questions were analysed using simple mean and standard deviation statistics; while the two null hypotheses were tested for acceptance or otherwise using t-test statistics.

3. RESULTS AND DISCUSSION

Research Question 1: What is the effect of the observational learning method on students' achievement in energy quantization?

Table 6 shows the achievement of the students who took part in PATEQ and were taught physics using the observational learning and conventional teaching methods. The mean gain score of students taught using the

former method was 15.17, while that of those taught using the latter was 10.08. The mean gain difference between the post-test and pre-test scores of the physics students taught using the observational learning method was 15.17, while the mean gain difference between the post-test score and pre-test score of students taught using the conventional teaching method was 10.08. The difference in the mean gain score between the two groups was 5.09, in favour of those taught using the observational learning method. In order to confirm if the difference was statistically significant, Hypothesis 2 was tested for acceptance.

Table 6. Students' Achievement in Energy Quantization when taught using OLM and CTM

Group	Group Statistics	Pre-test	Post-test	Mean Gain	Difference
OLM	N	41	41		
	Mean	5.90	21.07	15.17	
	Std	2.89	4.55		
CTM	N	48	48		
	Mean	6.21	16.29	10.08	
	Std	3.39	5.15		5.09

OLM= Observational learning method CTM= Conventional teaching method

Research Hypothesis 1: There is no significant difference in the achievement of students taught energy quantization using the observational learning method and those taught using the conventional teaching method.

Table 7. t-test Analysis of the Effect of OLM on Students' Achievement in Energy Quantization

Groups	N	Mean	Std.	Df	T	Sig.	Remark
OLM	41	21.07	2.89	87	7.09	.00	*S
CTM	48	16.29	3.39				

P < 0.05

OLM= Observational Learning Method; CTM= Conventional Teaching Method

Table 7 shows the independent t-test of the post-test scores of the students taught energy quantization using the OLM and those taught using the CTM. It can be seen that a t-test value of 7.09 was obtained at a significance level of 0.00. Since the calculated value of 0.00 is less than the alpha value of 0.05, Hypothesis 1 is therefore not accepted. This implies that there is significant difference in the achievement scores of students taught energy quantization using the two methods in favour of those taught the OLM.

The results from research question one reveal that the OL method has an effect of students' achievement in energy quantization compared to that of those taught using the CT method. This implies that the two groups differ in their achievement because the mean gain scores of those taught using the OL method were higher than those of students taught using the CT method. Hypothesis 1 proposed that there would be no significant difference in the achievement scores of students taught using the two methods. The findings in relation to Hypothesis 1 reveal that the two teaching methods had an effect on the achievement of students, since the post-test mean scores of each of the groups were higher than their respective pre-test mean scores. The results also show that the students taught using the OL method scored better than those taught using the CT method. This is in line with with Craig, Gholoson, Brittingham, Williams and Shubeck (2012), who found that students taught physics through observation of deep questions and self-explanation, which is an aspect of observational learning, performed better than their counterparts taught with other teaching methods.

Research Question 2: What is the effect of the observational learning method on students' retention in energy quantization?

Table 8. Students' Retention in Energy Quantization when taught using OLM and CTM

Group	Group Statistics	Retention-test	Post-test	Mean	Gain/Loss
OLM	N	41	41		
	Mean	19.90	21.07	(1.17)	
	Std	5.29	4.55		
CTM	N	48	48		
	Mean	16.87	16.29	0.58	
	Std	3.81	5.15		

OLM= Observational learning method; CTM= Conventional teaching method, () = Loss

Table 8 shows the retention results of the students who took part in PATEQ when taught using the two methods. The retention mean score of those taught using OL was 19.90, while the post-test mean score of students taught using this method was 21.07. The mean retention score of students taught using the OL method is therefore 1.17 lower than the mean post-test scores of students taught using OL. In the control group, the retention mean score of students was 16.87, while the post-test mean score was 16.29. This implies that students taught physics using the conventional teaching method were able to retain concepts better, with a mean gain of 0.58. The efficacy of the effect of OL on physics students' retention scores was tested for acceptance in Hypothesis 2

Research Hypothesis 2: There is no significant difference in the retention of students taught energy quantization using the observational learning method and those taught using the conventional teaching method.

Table 9. t-test Analysis of the Effect of OLM on Students' Retention in Energy Quantization

Groups	N	Mean	Std.	Df	T	Sig.	Remark
OLM	41	19.90	5.29	87	3.13	.00	*S
CTM	48	16.87	3.81				

$P < 0.05$

OLM= Observational Learning Method; CTM= Conventional Teaching Method

Table 9 shows the independent t-test of the retention test scores of students taught using the observational learning method and those taught using the conventional teaching method. It can be seen that a t-test value of 3.13 was obtained at a significance level of 0.00. Since the calculated value of 0.00 is less than the alpha value of 0.05, Hypothesis 2 is therefore not accepted. This implies that there is significant difference in the retention scores of students taught energy quantization using the two methods in favour of those taught using CT.

The results related to research question 2 show that the two groups differ in their retention mean scores; however, OL did not have a positive effect on students' retention in energy quantization when compared to the retention of those taught using CT. Those taught using the latter method were able to retain concepts learnt better than those taught using the former. Hypothesis 2 proposed that there was no significant difference in the retention of students taught energy quantization using the two methods; however, the investigation shows that there was a significant difference in favour of CT. The two teaching methods had an effect on the retention of students, but the retention mean scores of students taught using the CT method were higher than those of students taught using OL. This result agrees with the finding of Oluwatosin and Bello (2014), who found that the CT method had a positive influence on physics students' achievement when compared to the use of other teaching methods. However, the results of this investigation disagrees with the findings of Akinbobola and Bada (2018) and Bada and Afolabi (2020), who found significant differences in the achievement of physics students taught using modern teaching methods.

4. CONCLUSION

This study investigated the effects of observational learning (OL) on senior secondary school physics student's achievement and retention. It involved 89 senior secondary school students in Ondo, Nigeria. The findings show that the use of OL to reinforce teaching is more effective in enhancing achievement than the CT method. This implies that OL has the capacity to encourage a hands-on, eyes-on approach, thus helping students to understand, comprehend and apply physics concepts to real life situations. The findings also show that those taught using the observational learning method had a higher mean gain when compared to those taught using the CT method and the test was also significant. The research also found that there was significant difference in the retention of students taught using the two methods in favour of those taught using CT. This shows that even though observational learning (OL) does not guarantee better retention of physics concepts when compared to CT methods, it still recorded a higher retention score than that of students taught using the CT method. This means that OL has the capacity to make students excel in their academic pursuit in physics, thus ensuring better grades. The following recommendations are considered appropriate based on the study findings. Observational learning significantly enhances physics students' achievement in physics, so it is recommended that it should be used by physics teachers to improve and reinforce instruction in senior secondary schools. Teacher education

curriculum planners should be encouraged to integrate observational learning into the curriculum for teacher trainees so that they can learn the concept. This will further prepare teacher trainees to be more efficient in their profession. Through its appropriate agencies, the government should be encouraged to organise seminars, workshops and conferences for in-service physics teachers on how to implement observational learning in their different schools. This will go a long way to improving the grades of secondary school students in physics.

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