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COMPUTER LITERACY, ATTITUDE TO COMPUTER AND LEARNING STYLES AS PREDICTORS OF PHYSICS STUDENTS' ACHIEVEMENT IN SENIOR SECONDARY SCHOOLS OF OYO STATE

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ABSTRACT
Physics, a subject in the senior secondary school occupies a central position in science education. Physics in this 21st century as a course of study and field is experiencing new discoveries at such a rate that it cannot continue to be taught using only traditional and conventional method and the teacher–centred approach. The invention of computer-based resources for teaching the subject would be a great advantage if explored. Hence, the factors which impede students' use of computer technology in learning of Physics however need to be investigated. This study investigated three of these factors and found that student's computer literacy, attitude to computer and learning styles jointly correlate with achievement of students in Physics (R = 0.18) with each factor making respective relative contributions. While computer literacy could not predict the dependent measure (B= -0.055; t = -0.67; p<0.05), attitude to computer could (B= 0.18; t = 1.09; p>0.05) and learning styles could not (B= 0.20; t = 0.25; p>0.05). It was recommended that Physics students should be motivated to learn and be equipped with computer appreciation and operational skills while computer systems need to be made available and accessible for Physics learning in the school system.

Key words: Computer literacy, attitude to computer, learning styles, students' achievement in physics,
Word count: 198

INTRODUCTION
Technology has so much relevance to education as the major difference between the developed and underdeveloped countries of our world today basically lies in technology utilisation, applications, production and advancement. As a result, any education that is void of technology in content, method and implementation could be said to be sub-standard and undeveloped. Computer remains the only gadget that houses the power of technological advancement. In Nigeria today,

computer technology has become so important that students who do not have access to computers and internet were likely to get further behind their peers who did have such access (Son *et al.*, 2011; Patrick and Benwari, 2014; Abimbade, 2017).

Information and communication technology (ICT) in education has been described as the application of digital equipment to all aspects of the process of teaching and learning. In teaching and learning, Technology aid the act of providing education to learners in such a way that it assist to imbibe in the learner required capacity for the world of work (Ahmet *et al.*, 2008; Adeyemo, 2010).

The idea of what it means to be computer literate is inevitably extended and the question of how to develop and improve the ability of using computers is considered as a key issue in the area of teacher education. Computer literacy encompasses the knowledge and application of basic tools like Microsoft excel, power point, Microsoft word, the ability to recognise and apply the distinctions of various technological field as a resource by design or by utilisation for a student in the 21st century be it in the secondary school or higher institution of learning (Son, 2004; Son *et al.*, 2011).

Science as a rationally structured knowledge about nature embraces systematic methods and relative attitudes for its acquisition, teaching, learning and application. Science, technology and physics are conceived in their broadest scope of interpretation, in this connection, science and technology are understood and explained as accumulated and systematized knowledge in form of concepts, laws and theories (Abimbade, 2017). Science and physics is known to have begun with the ancient Greek. Physics is subsumed in science, just as science is applicable to technology. Man's inquisitive nature led him to more careful observation on nature and natural phenomenon. The insights developed assisted in the building up of the systematic knowledge, processes and attitudes that constitute physics, mathematics and science. The practice of physics has provided mankind with a wide variety of benefits. The pure science has invariably merged into the applied science to make up what is referred to as very close partners because of the common links. Science and technology are thus complementary fields of knowledge which has helped to nurture, overhaul and upgrade one another (Abimbade, 1991, 1997, 2017).

A concept that has provided some valuable insights into learning in both academic and other educational settings is learning style. Learning styles has been defined as a consistent way of functioning that reflects the underlying causes of learning behaviour (Keefe, 1987). Learning style is both a characteristic which indicates how a student learns and likes to learn, as well as instructional strategy informing the cognition, context and content of learning. Previous studies have reported that students' learning performance could be improved if proper learning style dimensions could be taken into consideration when developing any learning or instructional process. Therefore, learners' knowledge of their learning style preference can help them optimally develop their meta-cognition and learning skills and abilities thus maximizing learning (Keefe, 1997; Sternberg and Grigorenko, 1997; Graf and Liu, 2010; Gokalp, 2013).

Physics is been offered by all Science-based secondary school students as it prepares the future scientists for meaningful living in the society and for higher learning. The teaching and learning of Physics in schools have over the years been based on traditional and foreign textbooks and at best Physics laboratories despite the emerging trend in technology-based learning, the invention and availability of computer technology and a wide range of Physics teaching resources that are computer based and has been proven to enhance learning. Little of these have been explored to ameliorate the problems of learning Physics in the secondary education in Nigeria. In recent years, the use of technology for lesson delivery has mostly been to enhance student's personal learning by enquiry. Few scholars and agencies have tried to get a solution to the problem of the large, difficult to comprehend volume of calculations in senior school Physics contents by introducing electronic content and making it available to the students on various electronic media. These efforts revealed that the inability to comprehend certain concepts in Physics is really a critical problem thereby leading to poor performance. There is therefore the need to explore more effective strategies that will be learner-enhanced. The lack and poor utilisation of available computer resources by Physics students necessitates this study, to investigate the extent to which selected Nigerian Physics students' computer literacy, attitude to computer and learning style would predict their achievement in Physics.

Hypotheses:

The study tested the following null hypotheses at 0.05 level of significance.

Ho_1: There is no significant main effect of students' computer literacy on achievement in Physics.

Ho_2: There is no significant main effect of students' attitude to computer on students' achievement in Physics.

Ho_3: There is no significant main effect of students' learning style on students' achievement in Physics.

Scope of the Study

The study was limited to senior secondary school II (SS 2) students in some selected secondary schools in Ibadan South West Local Government Area of Oyo State. Seven (7) secondary schools and students from each of these schools were randomly selected and used for the study. Moreover, this study examined computer literacy, attitude to computer and learning styles as predictors of students' achievement in Physics.

METHODOLOGY

Research Design

This study adopted the descriptive survey that employs a correlational method in data collection. This design was used to find detailed description of the computer literacy, attitude to computer and learning styles exhibited by the students. Also, it was also used to investigate how these students' related variables (computer literacy, attitude to computer and learning styles) determines students' achievement in Physics.

Variables of the Study

Independent variables:

1. Physics students' computer literacy
2. Physics student' attitude to computer
3. Physics students' learning style

Dependent variable:

Physics students' achievement

Population

The population of the study comprises all Physics students in Senior Secondary Schools in Ibadan, Oyo state Nigeria.

Sample and Sampling Technique

Seven secondary schools comprising five small class sizes (numbering above 10 students) were purposively selected from Ibadan South West Local Government Area (LGA) of Oyo State. Ibadan South West LGA is one of the largest in Oyo state. It is densely populated and understandably consists of students of mixed ability groups. The researcher incidentally schooled and once resided in the area, for easy accessibility, the LGA was selected. The selected schools satisfied the criteria such as being co-educational, having presented candidates for West African Senior School Certificate Examination (WAEC-SSCE) and National Examination Council Examinations (NECO-SSCE) for at least ten years. Have qualified and experienced Physics teachers.

The senior secondary school two (SS II) class was considered suitable for this study because students are assumed to have acquired enough scientific skills on which evaluation could be based at this level. One intact class of SS II was selected randomly from each school. The participants were made up of 151 SS II students from seven (7) purposively selected schools in Ibadan South West Local Government Area (LGA) of Oyo State.

Research Instrument

The research instrument developed for this study was tagged 'Physics students' Computer Literacy, Attitude and Learning Style Questionnaire" (CLALSQ). The purpose of the questionnaire was to collect data on the independent and dependent variables. Section A dealt with the demographic data such as gender, age, class, name of school and location. Section B consists of 24 items on Physics students' computer literacy presented on 4-point Likert scale of strongly agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). Section C features 7

items on learning style inventory. Section D features 20 items on a Likert type scale of Strongly Agree (SA), Agree (A), disagree (D) and strongly disagree (SD) to elicit information on students' attitude toward computer and Students' past record in Physics was collected.

Validation of 'Physics students' Computer Literacy, Attitude and Learning Style Questionnaire" (CLALSQ).

In other to ensure the face and content validity of CLALSQ, it was given to experts in the Department of Science, Mathematics and Technology Education, University of Ibadan. In order to ascertain the reliability of the instrument, an initial pool of 40 items were trial tested on twenty (20) Physics students in a school in Ibadan North Local Government who were not part of the sample for the main study. Their responses were used to determine the reliability of the questionnaire in terms of the inter–item consistencies using Cronbach alpha. This yielded alpha values of 0.79, 0.55 and 0.78 for sections B, C, and D respectively. Squares of these produced 0.62, 0.31 and 0.60 which suggest that the scales are reliable. The final version of CLALSQ items was then selected.

Procedure of Data Collection

The researcher contacted the principals of the schools involved and discussed in detail what the project entails.

The instrument CLALSQ was administered in the seven schools and the students' past result record was collected.

Procedure of Data Analysis

Data collected was analysed using descriptive statistics which include frequency count, percentage, mean and standard deviation as well as charts. The inferential statistics of multiple regressions was employed to provide answers to the three (3) research questions raised.

Method of Data Analysis

Data collected from the study was analysed using both descriptive and inferential statistics. Descriptive statistics involve frequency count and simple percentage to present the characteristics and responses of the respondents while the inferential statistics involves Pearson Product Moment Correlation (PPMC) and multiple regressions analysis to provide answers. All hypotheses were tested at $p< 0.05$ level of significance.

RESULTS AND DISCUSSION

The study adopted the use of questionnaire and three hypotheses were tested. Finally, the answers to the hypotheses were discussed in relation to the relevant literature reviewed.

Research Hypotheses

Ho_1: There is no significant main effect of students' computer literacy on achievement in Physics

Table 1: Pearson Product Moment Correlation of students' learning style and their Achievement in Physics

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	25.806	1	25.806	.177	.675[b]
	Residual	21778.658	149	146.165		
	Total	21804.464	150			

a. Dependent Variable: Total score
b. Predictors: (Constant), computer literacy

The table 1 with the Friedman ratio value of 0.177 and the significant value (0.675) show that the null hypothesis that the model is not a good fit is being accepted and we can emphatically say that the model that was specified was not a good fit and cannot be used to predict and see how the predictors predict the dependent variable in the model.

Table 2: Summary of Multiple Regression Analysis showing the composite Contribution of the independent variable on students' achievement in Physics

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	49.834	2.090		23.845	.000
	Computer literacy	-.016	.039	-.034	-.420	.675

a. Dependent Variable: Total score

The coefficient table 2, which is to look at the beta functions of the model and we can see that the computer literacy has a beta value of -0.034 and these translate that for every 1% increase in Physics students achievement is caused by -0.034% of Physics students

computer literacy, and these coefficient have a t-test value -0.420 and these t-test value is not statistically significant as it is higher than the acceptance value.

Table 3: Model summary of computer literacy and physics students' achievement

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.034[a]	.001	-.006	12.090

a. Predictors: (Constant), computer literacy

The model summary however shows that there is a relationship of 0.034 between the predictor that is used in the model i.e. (Physics students' computer literacy, and achievement score) and the R square which shows the level at which the predictor explain the model is 0.001 i.e. 1%, and we can see that the adjusted R square reduced to negative value of -0.006 after the error were being free from the model and we can say that computer literacy, can predict the achievement up to 1% and the other 99% are being explained by other variables that are not included in the model. We can then say that the R square is not high enough to predict the model.

H_{O2}: There is no significant main effect of students' attitude to computer on students' achievement in Physics

Table 4: The regression table to look at the beta functions of attitude to computer

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	631.843	1	631.843	4.447	.037[b]
	Residual	21172.621	149	142.098		
	Total	21804.464	150			

a. Dependent Variable: Total score
b. Predictors: (Constant), ATTITUDE

The table 4 with the Friedman ratio value of 4.447 and the significant value (0.037), show that the null hypothesis that the model is not a good fit is being rejected and we can emphatically say that the model that was specified was a good fit and can be used to predict and see how the predictors predict the dependent variable in the model.

Table 5: The coefficient table to look at the beta functions of attitude to computer

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	44.029	2.575		17.097	.000
	ATTITUDE	.116	.055	.170	2.109	.037

a. Dependent Variable: Total score

The coefficient table which is to look at the beta functions of the model and we can see that the attitude towards computer has a positive beta value of 0.170 and these translate that every 1% increase in Physics students achievement is caused by 0.17% of Physics students attitude to computer, these coefficient have a t-test value positive 2.109 and this t-test value is statistically significant, it is under the acceptance level of 5%.

Table 6: Model summary of attitude to computer and physics students' achievement

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.170[a]	.029	.022	11.920

a. Predictors: (Constant), ATTITUDE

The model summary (Table 6) however shows that there is a relationship of 0.170 between the predictor that is used in the model i.e. (attitude towards computer and achievement score) and the R square which shows the level at which the predictor explain the model is 0.029 i.e. 2.9%, and we can see that the adjusted R square reduced to 0.022 after the error were being free from the model and we can say that attitude towards computer can predict the achievement of the respondents and it can predict the achievement up to 2.9% and the other 97.1% are being explained by other variables that are not included in the model. We can then say that the R square is not high enough to predict the model.

H_{O3}: There is no significant main effect of students' learning style on students' achievement in Physics.

Table 7: The regression table to look at the beta functions of learning style and achievement

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	760.074	4	190.019	1.318	.266[b]
	Residual	21044.389	146	144.140		
	Total	21804.464	150			

a. Dependent Variable: Total score
b. Predictors: (Constant), AS, AC, DV, CV

The method that is used for the regression of this is enter method. The table 7 with the Friedman ratio value of 1.318 and the significant value (0.266) show that the null hypothesis that the model is not a good fit is being accepted and we can emphatically say that the model that was specified was not a good fit and cannot be used to predict and see how the predictors predict the dependent variable in the model.

Table 8: The coefficient table to look at the beta functions of learning style and achievement

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	44.923	11.192		4.014	.000
	CV	-.226	.247	-.083	-.915	.362
	DV	.119	.250	.040	.477	.634
	AC	.402	.288	.124	1.395	.165
	AS	-.095	.286	-.027	-.330	.742

a. Dependent Variable: Total score
CV – Convergent learning style; DV – Divergent learning style; AC – Accommodating learning style; AS – Assimilating learning style

The coefficient table which is to look at the beta functions of the model and we can see that the learning styles of the student are being delineated and we can see that the DV and AC learning styles has a

positive coefficient values of 0.040 and 0.124 respectively, while CV and AS has a negative coefficient value of -0.083 and -0.027. Also the t-test value for the beta value of DV and AC learning styles has a positive values of 0.477 and 1.395 respectively while the one of CV and AS has a negative t value of -0.915 and -0.330. The t-test value for all the learning styles is not significant, the significant value is higher than the acceptance region meaning that as the value of learning styles increases there will be a drop in the achievement of Physics students. These shows that from the variables that are included in the equation for predicting the student achievement in Physics the learning styles cannot be used to predict their outcome in Physics subject.

Table 9: Model summary of learning style and physics students' achievement

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.187[a]	.035	.008	12.006

a. Predictors: (Constant), AS, AC, DV, CV

CV – Convergent learning style; DV – Divergent learning style; AC – Accommodating learning style; AS – Assimilating learning style

The model summary however shows that there is a relationship of 0.187 between the predictor that is used in the model i.e. (learning styles and achievement score) and the R square which shows the level at which the predictor explain the model is 0.035 i.e. 3.5%, and we can see that the adjusted R square reduced to 0.008 after the error were being free from the model and we can say that the learning stylecan predict the achievement of the respondents and it can predict the achievement up to 3.5% and the other 96.5% are being explained by other variables that are not included in the model. And we can then say that the R square is not high enough to predict the model.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary of findings

Computer literacy had a negative beta value of -0.055 that is used in predicting the achievement of Physics students and the t-test value of this coefficient value is also negative that is -0.667, the t-test value is not significant because the significant value is higher than the acceptance region and this means that when the value of computer literacy increases there will be a drop in the achievement of Physics

students. This is not statistically significant at 5% level of significance. These shows that from the variables included in the equation to predict the student achievement in Physics, only attitude towards the usage of the computer for learning is the most paramount that can predict their outcome in Physics subject.

Learning styles cannot be used to predict their outcome in Physics subject. The model summary however shows that there is a relationship of 0.187 between the predictor that is used in the model i.e. (learning styles and achievement score) and the R square which shows the level at which the predictor explain the model is 0.035 i.e. 3.5%, and we can see that the adjusted R square reduced to 0.008 after the error were being free from the model and we can say that attitude towards computer can predict the achievement of the respondents and it can predict the achievement up to 3.5% and the other 96.5% are being explained by other variables that are not included in the model. And we can then say that the R square is not high enough to predict the model.

Educational Implications of findings

The attitude of the learners and computer literacy has been found to positively affect the enhancement of students' achievement in Physics. The findings have therefore revealed importance of using computer and attitude enhancement for effective learning. The study also revealed that there is need to incorporate in our educational system computer skills and science method help to improve the corresponding learning outcomes in Physics.

The findings of the study also have implication for education sector in the area of training and retraining of teachers for professional developments and computer skill acquisitions. The study revealed that there is need for both males and female students to be given training in computer use for learning. Both public and private school students should be given appropriate attention, efforts and space for a better academic achievement and attitude to learning. Students in both schools need close monitoring and assistance by teachers and parent in their academic endeavours.

Contributions to Knowledge

1. Computer literacy possesses a level of significance achievement with the conventional lecture method of teaching Physics.
2. Attitude to Computer produces a better level of achievement with the conventional lecture method of teaching Physics.

3. Learning styles helps learners to actively construct, analyse and evaluate their learning processes for effective learning.
4. Computer literacy and attitude to computer enhance the problem solving skills, team spirit and make learners responsible for their learning.
5. The instruments developed and used in this study which can also be used in other study serve as contribution to body of knowledge.
6. The study would form empirical evidence for subsequent researchers in Physics and other science related disciplines.

Conclusion

Based on the findings of this study, the following conclusions are drawn:

- Computer literacy strategy was found to enhance achievement in Physics with what is attained when conventional lecture method only is used.
- Attitude to computer was found to enhance achievement in Physics with what is attained when conventional lecture method only is used.
- Gender has no influence on achievement and attitude in Physics.
- School type has no effect on achievement and attitude in Physics.

Generally, the educational system in Oyo state and indeed the country have no smooth running of education; all levels of education are plague with catalogue of problems ranging from under funding to under management or mismanagement. There is no way our society could go forward except in the direction of more science, more introduction of technologies, more manipulation and control by man on the aspects of physical environment. If our schools throughout the country are to maintain maximum educational standards, they should be provided with adequate funds and infrastructural facilities.

Recommendations

Based on the findings of this study, the following recommendations are hereby made:

(i) In order to improve students' performance in Physics, computer training in basic computing are recommended for secondary school Physics teachers for the teaching of the subject.

(ii) In order to improve students' performance in Physics, computer training in basic computing are recommended for secondary school Physics students for the learning of the subject.
(iii) Teachers should facilitate the teaching of the subject with positive reinforcement in schools to improve students' attitude and their achievement in the subject.
(iv) Students should be allowed to take responsibility of their learning and be made to take active role in the process of teaching and learning in Physics classroom instruction.
(v) Government and professional bodies such as STAN, NERDC, etc. should exposed Physics teachers to the use of computer in teaching through seminars and workshops and in teacher training institutions to facilitate better performance of senior secondary school Physics students.

Suggestions for Further Studies

Future research should focus on the effect computer literacy and attitude to computer in other science subject such as Chemistry, Biology, Agricultural Science and Mathematics. It is also suggested that similar studies could be extended to the likes of ability levels, cognitive styles, personality traits, ethnicity, age, socio-economic status of students. The study could also be replicated in other geopolitical zones in Nigeria apart from one local government area in Oyo State, using more local governments, states, schools, teachers and students.

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