Pakistan Journal of Distance & Online Learning
Volume: XI, Issue I, 2025, 1-13

Teachers' Attitude Towards ICT and its Usage as Predictors of Senior Secondary Students' Performance in Physics

Afeez Tunde Jinadu*
Jamiu Amusa**

Abstract

The study investigated teachers' attitude towards ICT and its usage as predictors of senior secondary student performance in Physics. The study employed a correlation survey to sample 105 respondents drawn from five schools. Three instruments; TAIQ (r=0.86), TIUQ (α = 0.78) and PAT (r=0.83) were employed. Pearson correlation and multiple regression analysis were employed. Teacher ICT attitudes and ICT usage correlate positively with students' achievement in Physics {r = 0.542; r = 0.521 both $p < 0.05$). There is a combined influence of teachers' ICT attitude and ICT usage on students' achievement in Physics ($R^2 = 0.565$). Independently, teachers' attitudes (β = 0.346) influenced student achievement in physics more than ICT usage (β = 0.268). The study established the predictive ability of teachers ICT attitude and ICT usage for enhanced students' academic achievement in physics. Therefore, there should be provision of improved access to ICT facilities in schools and teachers should be encouraged to form positive attitude towards ICT.

Keywords: *Teachers' attitude, ICT, academic achievement, Physics*

*Nigerian Institute of Social and Economic Research Ibadan, Nigeria.
Email: afeezjinadu95@gmail.com
**Lead City University International School Ibadan, Nigeria.
Email: ibnhamzaht@gmail.com

Introductıon

Being a foundational field of study, physics is essential for comprehending the world around us and fostering technological progress. It establishes fundamental principles which uphold science and its applied specialization like mechanical, electrical, thermo dynamical and quantum physics. Knowledge of Physics is vital in the secondary school curriculum since it influences advances in industries including transportation, energy production, medicine, and telecommunications (Bello & Jinadu, 2025; Jinadu & Amusa, 2025). Physics helps learners thinking critically, reason analytically, and solve problems that are essential for scientific advancement and national development (Ajayi, 2018). Physics instruction in Nigeria makes a large contribution to the country's industrial and technological progress. Recent developments in physics have resulted in innovations that improve the economy and quality of life, as seen in fields like space exploration, energy production, and efficient sustainable energy, medical imaging, and transportation (Anyakoha, 2014; Bello & Jinadu, 2025; Ibrahim et al 2022). For creating a workforce equipped to solve modern scientific and technological issues, it is essential to build a solid basis in physics.

Addressing current issues such poor laboratory facilities and inadequate teacher training is necessary to guarantee efficient physics instruction in Nigeria. Hands-on experiments, contextualizing physics ideas, and active learning methods (Korur, 2008) may all be used to enhance student interest and performance. Additionally, fostering constructive attitudes towards physics and providing teacher training in contemporary pedagogy are crucial (Yadav & Mehta, 2014). In Nigerian secondary schools, the teaching and learning of physics is hampered by issues including unfavorable attitudes, lack of interest, and subpar academic achievement. Physics can be challenging for many students because of its abstract and mathematical character (Korur & Eryilmaz, 2012). This, combined with inadequate teaching materials and poorly equipped labs, has led to a number of issues resulted in low pass rates on national exams (WAEC, 2020).

In Nigerian schools, pupils continue to struggle with understanding fundamental ideas, as seen by constantly low exam scores, which is a worry despite the significance of physics. The topic's abstractness, insufficient resources, and few labs are among the variables that influence performance. Furthermore, students frequently lack motivation, seeing physics as challenging and irrelevant, and new aspects like teacher attitudes toward ICT and ICT integration in instruction need investigation. A teacher's perspective encompasses their thoughts and opinions on

teaching methods and resources, particularly the use of information and communication technology (ICT). Negative attitudes result in resistance and restricted ICT usage, while positive attitudes include openness to technology adoption, enthusiasm for integrating digital tools, and willingness to adapt. According to research, positive teacher attitudes are associated with exciting, student-centered classrooms that enhance learning (Jinadu & Amusa, 2025; Yadav & Mehta, 2014).

The degree to which ICT is integrated is mostly determined by how teachers see it. Those who view ICT as advantageous integrate it into lessons more successfully, resulting in dynamic learning that makes physics interactive and accessible (Ajayi, 2018). On the other hand, unwillingness to embrace ICT continues obsolete practices, restricting students' access to contemporary learning resources. A teacher's perspective on ICT is significantly influenced by their digital literacy. Teachers with limited skills may feel intimidated by technology, whereas proficient instructors are more upbeat and apt to employ it. Sufficient training that integrates technical Teachers need training in instructional methods and skills in order to increase their confidence and ICT proficiency.

Addressing difficulties with digital skills, institutional support, workload, and resistance is necessary to promote constructive attitudes. When teachers place a high value on technology, they foster vibrant, student-centered classrooms that improve student outcomes. Teachers' use of ICT may be improved and physics instruction can be enhanced by ongoing training, peer collaboration, and strategic implementation. The frequency, kind, and efficacy of technology integration are all factors in ICT use in teaching. Interactive simulations, virtual labs, and digital presentations that aid in understanding physics concepts and improve comprehension are all examples of high ICT usage (Reeve and Lee, 2014). Low usage, brought about by restricted access or bad attitudes lessen ICT's possible advantages.

ICT integration is impacted by the availability of institutional help and infrastructure. ICT use is more prevalent in schools with well-equipped laboratories and internet access, while it is less so in schools that lack these resources. fight, which results in differences in the educational experiences of pupils (Chien et al, 2024). Interactive ICT adoption encourages student involvement and motivation by fostering active participation, teamwork, and the visual representation of complicated ideas. But, teachers and pupils are prevented from using ICT tools like social media and digital communication channels effectively due to their restricted availability

Korur & Eryilmaz, 2012; Jinadu & Okwilagwe, 2025; Okwilagwe & Jinadu, 2019).

Furthermore, ICT makes it possible to differentiate instruction and create personalized courses that cater to a variety of learning styles and speeds by utilizing adaptive platforms that provide supplementary materials, automation and simulations with tools like Skype, Zoom, WhatsApp, and other tools, these platforms make learning interactive and accessible, which is especially crucial during education in emergencies like the pandemic are widely used (Jinadu & Okwilagwe, 2025; Jinadu, 2024). Positive attitudes combined with effective ICT integration result in richer classrooms where physics concepts are made more understandable through digital simulations and multimedia. By addressing diverse learning styles, this strategy increases students' drive, comprehension, and achievement.

The importance of physics education in fostering scientific and technological advancements cannot be overstated. However, students' academic performance in physics has remained a major concern in Nigerian secondary schools. There are many predictors indicated in literature such as the complexity of physics concepts, ineffective teaching methods, and inadequate instructional resources. In recent years, ICT has been recognized as a potential tool to enhance teaching and learning by providing interactive media resources. Teacher ICT attitudes and the ICT use are two key areas that have predictive ability for students' academic performance in Physics. Previous studies have looked at ICT generally, others have examined teacher attitude different from that of ICT. It is against this backdrop that this study investigated teachers' attitude and ICT usage as predictors of students' academic achievement in Physics in Ibadan North area of Oyo state.

Literature Review

Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) by Davis (1989) offers a helpful theoretical framework for analyzing how teachers accept and utilize Information and Communication Technology (ICT) in the classroom. Perceived usability and perceived usefulness are the two primary factors that the Technology Acceptance Model (TAM) identifies as determining technology adoption. Perceived usefulness refers to the degree to which a user thinks a technology will improve their job performance (Davis, 1989), while perceived ease of use refers to how simple a user believes a technology can be used. They have a bearing on how teachers think and act using ICT to teach.

Because TAM deals with abstract concepts that students frequently struggle with, it is especially important in the field of physics education. By providing interactive and visual representations, ICT tools like simulations, animations, and virtual laboratories support TAM's focus by reducing cognitive burden and promoting a more thorough comprehension of ideas. This theoretical perspective is supported by research conducted in Nigeria. Secondary school teacher's perception of how simple it is to use ICT tools is a major determinant of how well they include them in lesson planning. Perceived utility is a key determinant in physics instructors' willingness to use technology to improve academic performance and student engagement.

Physics Teacher Attitude and ICT Integration

A person's attitude can be seen as a tendency to see things, people, or events in a positive or negative light. According to studies, there is a correlation between computer-related behavior and computer use in education. For example, teachers' attitudes about computers affect whether they believe that technology is useful, as well as whether they will use ICT in the classroom. Attitudes about computers in education had a big impact on how computers were used in the classroom (Myers and Halpin, 2002). These various studies were carried out off the shore of Nigeria setting, it then become imperative to investigate the situation in Nigeria setting hence, the current study.

Beyond the initial adoption, TAM has real-world ramifications. Higher integration levels are seen in schools that prioritize practical teacher training, focusing on both the practical and instructional advantages of ICT. Teachers' confidence and competence in using ICT, particularly in physics instruction, improved as a result of workshops on virtual labs and multimedia apps. To overcome obstacles like technical complexity and unfamiliarity, these results emphasize the need to match professional development with subject-specific teaching requirements.

In addition, the way teachers perceive ICT is heavily influenced by institutional backing. A supportive atmosphere for ongoing ICT usage is fostered by sufficient infrastructure, dependable internet connectivity, modern digital equipment, and access to instructional programs. Resource availability directly affects instructors' perceptions of ICT in Nigerian schools where infrastructures are issues as highlighted by Bello and Jinadu (2025). As a result, dealing with systemic hurdles is crucial to guarantee equitable ICT integration in various educational environments.

Objectives of the Study

The primary objective of this study is to examine the teachers' attitude and ICT usage as predictors of academic achievement in Physics in Ibadan North area of Oyo state. Specifically, the study aims to:

1. Investigate the link between teacher ICT attitudes and achievement in physics.
2. Investigate the link between teachers' ICT usage and achievement in physics.
3. Examine the combined influence of teacher ICT attitudes and usage on achievement in physics.
4. Determine the individual influence of teacher ICT attitudes and ICT usage to achievement in physics.

Hypotheses of the Study

1. There is no correlation between teacher ICT attitudes and academic achievement in physics.
2. There is no correlation between teachers' ICT usage and academic achievement in physics.
3. There is no combine influence of teachers' attitudes and ICT usage on academic achievement in physics.
4. There is no individual influence of each of the predictor variables on academic achievement in physics.

Methodology

Design

The study used non-experimental design of correlation study to investigate the problem.

Sampling Technique and Sample

The study employed a multistage sampling technique to select the sample. In the first stage, simple random sampling was used to select five public secondary schools from the current 48 schools in Ibadan North. In the second stage, purposive sampling technique was used to select senior secondary school II class. The reasons for this selection are that the class has covered appreciable areas in the Physics curriculum for senior secondary school and more the class is not preparing for any external examination. In the third stage, simple random sampling was employed to sample twenty physics learners and their teacher each from each of the chosen school making five physics instructors and one hundred learners.

Instruments for Data Collection

The study utilized (3) tools: the Teacher Attitude to ICT Questionnaire (TAIQ), the Teacher ICT Usage Questionnaire (TIUQ), and the Physics Achievement Test (PAT).

1) The researcher created the Teacher Attitude to ICT Questionnaire to gauge physics teachers' attitudes toward and opinions on Information and Communication Technology (ICT). It is split into two sections: section A discusses the teacher's bio data, while section B discusses their perspective on ICT. Teachers were instructed to answer using a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree).
2) The researcher also created the Teacher ICT Usage Questionnaire to determine the degree and frequency of ICT integration in physics education. It is also separated into two sections: section A, which covers teacher bio data, and section B, which discusses ICT use. Teachers were instructed to answer on a five-point scale, ranging from never (1) to very frequently (5).
3) The Physics Achievement Test was also developed to measure students' academic progress in physics. With a total time of 40 minutes, it is divided into two sections: section A, which covers student biographical data, and section B, which has 30 multiple-choice questions, each worth one point.

To evaluate the validity of the instruments, copies of them were issued to Physics teachers and psychometricians to ensure content and construct validity. The survey was conducted, and the data was analyzed using Cronbach's Alpha and Kud.er Richardson_20, which produced the following values for TAIQ, TIUQ, and PAT, respectively: 0. 86, 0. 78, and 0. 83. All participants were guaranteed informed consent, confidentiality, voluntary participation, the option to withdraw, and data protection throughout the research.

Findings

Table 1

Descriptive statistics of the sample

S/N	Variable	Frequency
1	Gender	
	Male	65 (61.9%)
	Female	40 (38.1%)
2	Designation	
	Teacher	05 (4.8%)
	Student	100 (95.2%)

Demographic statistics is shown in Table one. The table showed that the respondents were made of 65 (61.9%) male and 40 (38.1%), the table

also indicated that 5 (4.8%) teachers and 100 (95.2%) students participated in the study. This implies that there were more male participants than female participants in the study. Also, there were more students than teachers in the study.

Table 2

Correlation between Teacher ICT Attitude and Academic Achievement in Physics

Variables	N	X	SD	R	p-value	Remark
Attitude towards ICT	05	56.54	8.018	0.542**	0.000	Sig
Performance in Physics	100	61.89	17.152			

The link between teacher ICT attitudes and student academic achievement in physics is seen in Table 2. According to the data, there is a statistically significant moderate positive association between instructor ICT attitudes and students' physics performance (r = 0. 542; P = 0. 000). This suggests that a student's academic achievement in physics is greatly impacted by the teacher's ICT attitude.

Table 3

Correlation between Teacher ICT Usage and Achievement in Physics

Variables	N	X	SD	R	p-value	Remark
ICT Usage	05	42.03	14.243	0.521*	0.000	Sig
Performance in Physics	100	61.89	17.152			

The link between teacher ICT use and student achievement in physics is shown in Table 3. According to the table, there is a statistically significant, moderate positive relationship between teacher ICT use and students' physics achievement (r = 0. 521; P = 0. 000). This suggests that a teacher's use of ICT has a major impact on how well students do in Physics. On the other hand, higher teacher ICT use will result in improved academic achievement in Physics, and vice versa.

Table 4
Model Summary

Model	R	R^2	Add R^2	Std. Error of the Estimate
	0.752	0.565	0.527	14.20615

Table 5
Regression ANOVA

Model	SS	df	MS	F	P-value
Regression	10012.747	2	5006.374	24.807	0.000**
Residual	20585.100	102	201.815		
Total	30597.848	104			

The regression and model summary are shown in Table 4 and 5, respectively. The multiple R2 is 0.565, or 56.5%, and the adjusted R square is 0.527. i.e 52.7%. The implication is that the predictor variables account for the diversity in students' academic achievement in Physics. At the $p < 0.05$ level, the statistical significance is roughly 52.7%. Additionally, the Analysis of variance of the multivariate regression data is shown in Table 5. The F-ratio calculated by this was $F(2,102)= 24.807$, which was deemed statistically significant at the 0. 05 Alpha level.

Table 6
Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig
	B	Std. Error	Beta		
(Constant)	6.508	10.903		.597	.552
Attitude towards ICT	.739	.255	.346	2.899	.005**
ICT Usage	.323	.144	.268	2.251	.027**

The share of predictor variables to the outcome of achievement in physics is displayed in Table 6. The two predictor variables, teacher attitudes toward ICT and teacher ICT use, made a significant contribution to the prediction model at the 0. 05 level. β for teacher attitude about ICT = .255; $t(105)= 2.899$; $p<.05$), and ICT use (β = .144; $t(105) = 2.251$; $p<.05$).

Discussion

According to the study, relationship between students' physics performance and teachers' attitudes toward ICT, a positive connection

between teachers' attitudes toward ICT and students' achievement in physics exist, which was statistically significant. This demonstrates that instructors' use of ICT has a major impact on pupils' performance. This result supports Ajayi's (2018) research, which showed that teachers who have good attitudes toward ICT tend to include it in their instruction. Teaching improves students' performance in difficult topics like physics. ICT tools, such as simulations, help students visualize abstract ideas, making them simpler to comprehend and remember, is further supported by the study.

According to the results, there was a strong link between the way teachers use ICT and how well their students performed in physics. The degree to which instructors employ ICT in their instruction, as measured by the ICT Usage Index, seems to have a major influence on students' academic achievement in physics. Teachers' increased use of ICT leads to improved student achievement, whereas decreased use leads to worse results. This conclusion is consistent with that of Bello and Jinadu (2025), who found that frequent ICT usage enhances pupils' academic performance, particularly in academic areas similar to physics, where conceptual knowledge is improved by visualisations and simulations.

A linear correlation between predictors on students' Physics achievement was found between the predictors and the outcome variables. These independent variables were discovered to account for a large and statistically significant percentage of the variation in students' academic achievement. An F-ratio, which was statistically significant, was produced by the ANOVA of the multiple regression data. Excessive ICT use facilitates interactive and visually rich instruction, which leads to this conclusion to enhance students' understanding of complicated physics ideas. ICT tools enable quick feedback through online quizzes, which aids pupils in pinpointing and addressing areas for improvement.

The individual influence of the predictor variables on outcome variable was shown by the results, with both factors making a substantial contribution. Teachers' attitudes toward ICT have the greatest impact on students' performance in physics, followed by ICT use. According to Bello and Jinadu (2025), educators who have a positive outlook on ICT are more likely to use it wisely to enhance student learning results. Additionally, the study states that students who are taught by these instructors tend to do better in physics because ICT technologies make complex ideas more understandable and interesting. Additionally, the conclusion of this research is consistent with that of Yadav and Mehta (2014), who discovered that physical classes are improved by the use of films and virtual labs, which boosts student motivation and participation.

Conclusion

According to the study's findings, physics students' performance is strongly impacted by their teachers' attitudes toward ICT, as measured by their use of ICT. Positive teacher attitudes about ICT resulted in the integration of ICT into instruction, which increased student involvement, understanding, and, ultimately, higher grades in physics. It suggests that teacher attitudes and ICT use are good indicators of student achievement. Consequently, it is advised that government and educational organizations offer routine ICT training and seminars for physics teachers in order to increase their self-assurance and ability in using ICT technologies successfully. To encourage teachers to employ ICT in their classes, schools should also have sufficient ICT resources, such interactive whiteboards, projectors, and physics simulation tools. Additionally, incentives, professional development initiatives, and mentorship possibilities should be provided to teachers to help them incorporate ICT into their regular lesson plans in order to improve their performance in physics as a scientific discipline as well as in other academic subjects.

References

Ajayi P O (2018). Evaluation of instructional materials for the implementation of senior secondary school Physics curriculum in Nigeria. *Nigerian Journal of Counseling and Applied Psychology. 4*(1). 100-110.

Anyakoha, M. W. (2014). *Physics for senior secondary school I–III*. Lagos, Nigeria: Africana-FEP Publishers.

Bello, I. A. and Jinadu, A. T. (2025). Driving industrial development through TVET policy innovations in Nigeria: lessons from some international models. Nigerian Journal of Technical Education, 25(2), 70-77. DOI:10.63996/njte.v24i2.47.

Chien, S.P., Wu, H.K., & Hsu, Y.S. (2024). An investigation of teachers' beliefs and their use of technology based assessments. Computers in Human Behavior, 31, 198-210.

Ibrahim, A. I., Esaduwha, S. O., & Shitu, M. (2022). The problems and prospects of physics teacher education programme for sustainable development in Nigeria. *BW Academic Journal, 2*(1), 45-53.

Jinadu, A. T. (2024). Automated control and delivery system to public schools. *Journal of Learning Theory and Methodology, 5*(2), 70-75. DOI: 10.17309.

Jinadu, A. T. and Amusa, J. O. (2025). Physics student academic achievement at the interface of teacher attitude towards ICT and ICT usage. *International Journal of Education and Development using Information and Communication Technology (IJEDICT), 21*(2) (Part 2), 19-29.

Jinadu, A. T. and Okwilagwe, E. A. (2025). Assessment and modeling of research undertaking, digital-technology construct and researchers' statistical software skills. *International Journal of Research in Education and science, 11*(4), 759-778. DOI:10.46328/ijres.3724.

Korur, F. (2008). *Multiple case study on how Physics teachers' characteristics affect students' motivation in Physics* [Doctoral dissertation, Middle East Technical University, Ankara]. OpenMETU. https://open.metu.edu.tr/handle/11511/18282

Korur, F., & Eryılmaz, A. (2012). Teachers' and students' perceptions of effective physics teacher characteristics. *Eurasian Journal of Educational Research, 46*, 101-120.

Myers, J. M., & Halpin, R. (2002). Teachers' attitudes and use of multimedia technology in the classroom: Constructivist-based professional development training for school districts. *Journal of Computing in Teacher Education, 18*(4), 133–140.

Okwilagwe, E. A. & Jinadu, A. T. (2019). Researching the researcher digital nativity for quality Statistical software knowledge in South-western Nigerian federal universities. *African Journal of Theory and Practice of Educational Research, 7*(1), 129-135.

Reeve, J., & Lee, W. (2014). Students' classroom engagement produces longitudinal changes in classroom motivation. *Journal of Educational Psychology, 106*(2), 527–540.

Yadav, P., & Mehta, P. (2014). Importance of ICT in Education. *International Journal of Research in Social Sciences and Humanities, 5*(2), 118-123.

Jinadu, A. T. & Amusa, J. (2025). Teachers' attitude towards ICT and its usage as predictors of senior secondary students' performance in Physics. *Pakistan Journal of Distance and Online Learning, 11*(1), 1-13.