



**GAMIFIED INSTRUCTION AND LEARNING OUTCOMES IN BASIC TECHNOLOGY:
MEDIATING ENGAGEMENT AND MODERATING SCHOOL OWNERSHIP IN A QUASI
EXPERIMENTAL ANCOVA DESIGN**

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Abstract

Improving students' learning outcomes in Basic Technology is very important to the development of the technical knowledge, problem solving skills and competencies needed to participate in a society that is becoming increasingly technology oriented. However, the traditional lecture method of instruction in Nigerian secondary schools may not be engaging enough for learners and may not be effective in teaching the conceptual and practical aspects of Basic Technology. This study examined the effect of gamified instruction on students' academic achievement in Basic Technology with special reference to the mediating role of student engagement and the moderating role of school ownership and gender. A quasi-experimental 2x2x2 factorial design with pre-test and post-test measures and non-equivalent control groups was used. The study comprised 157 Junior Secondary II students randomly selected through multistage cluster sampling from eight secondary schools in Oyo Educational Zone of Oyo State, Nigeria. The study involved 91 students who received gamified instruction and 66 students who received conventional instruction, 82 students from public schools and 75 students from private schools, 95 male students and 62 female students. Data were collected through the Basic Technology Achievement Test (BTAT) with a reliability coefficient of 0.84 (KR-20) and Student Engagement Questionnaire (SEQ) with a reliability coefficient of 0.88. Data were analyzed using Analysis of Covariance (ANCOVA) at 0.05 level of significance controlling for pre-test scores. The results revealed a significant and large main effect ($F_{(1,151)}=145.04$, $p<0.001$, partial



$\eta^2=0.49$) for instructional strategy on students' achievement. The adjusted mean achievement score of students exposed to gamified instruction was 67.17 as against 46.52 for students taught conventionally. This difference of 20.65 points in favor of the gamified group. When controlling for the other variables, however, engagement did not significantly ($F_{(1,151)}=0.57$, $p=0.45$) predict achievement. Achievement was not significantly affected by school ownership ($F_{(1,151)}=0.38$, $p=0.54$), or gender ($F_{(1,151)}=1.33$, $p=0.25$). The result of the study concludes that gamified instruction is an effective strategy to improve Basic Technology achievement and can result in substantial learning gains in public and private schools and among male and female learners. Therefore, it is recommended that Basic Technology teachers should incorporate relevant gamification features into classroom instructions, school administrators should provide the necessary resources and support for implementation, policymakers should encourage evidence-based gamified instruction, and curriculum developers should include relevant gamification principles into the Basic Technology curriculum.

Keywords: Gamified instruction, basic technology, ANCOVA, mediating engagement, school ownership, gender equality, quasi-experiment.

Introduction

Improving learning outcomes in secondary schools' technical education is imperative in emerging economies striving to compete globally in the technology-oriented market place. In Nigeria, Basic Technology provides foundational education on the applied physical sciences, engineering graphics, and industrial materials (Nwachukwu & Johnson, 2020). However, the learning outcomes in this subject area are normally restricted by conventional instructional delivery methods, abstractness of concepts involved, and resource deficiencies (Badmus *et al.*, 2024). Conventional lectures do not always stimulate learners' interest or build up problem solving abilities in technical practices.

Gamified instruction refers to an interactive form of learning whereby the features of games, including progressive challenges, instant diagnostics, point systems, and competition among others, are incorporated into formal classroom instruction (Oby, 2024; Olowu, 2025). While the concept of gamified instruction has been hypothesized to have a positive impact on learners' performances because of engagement (Ahmed *et al.*, 2025; Aliyu *et al.*, 2025), more research is needed to understand the actual workings of this instructional approach. Namely, it should be understood whether engagement acts as a formal mediator of the positive impacts of gamification on learners' achievements, or whether gamified features themselves are responsible for building up cognitive schema.

Also, the validity of gamified instructional interventions should be explored concerning the moderating effects of various contextual factors, especially ownership type of school (public versus private) and learner gender. Public and private secondary schools in Nigeria operate under fundamentally different infrastructural, managerial and technological conditions (Salawu & Adedapo, 2001). At the same time,



exploring whether technological interventions are gender-neutral is necessary to ensure that technological innovations do not contribute to widening of gender gap in STEM areas (Adedapo, 2020).

The theoretical basis for researching the concept of gamified instruction comes from Self-Determination Theory and Cognitive Load Theory. According to Ryan and Deci (2000), Self-Determination Theory suggests that game structures meet learners' psychological needs for autonomy and competence, hence motivating them to learn. According to Sweller (1988), the concept of Cognitive Load Theory implies that properly designed gamified tasks break down difficult technical concepts to more manageable cognitive components, hence reducing extraneous cognitive loads and enabling cognitive schema acquisitions in subjects such as Basic Technology. In terms of literature (Nwachukwu et al., 2020) on Nigerian educational technology, the use of systematic instructional intervention models is traditionally recommended to overcome pedagogic stagnation. Based on instructional design frameworks like the ASSURE model, Adedapo and Opoola (2021) emphasize the importance of systematic delivery structure of media for setting learners' learning goals and optimizing cognitive processing.

Empirical investigations (Okoro, 2023) in various Nigerian educational settings show the superiority of media-assisted and strategy-driven instruction over traditional didactic teaching. As early as the beginning of 21st century, empirical investigations by Adedapo et al. (2001) showed that tape-recorded audio and video instructions substantially enhance learning outcomes in secondary school subjects compared to traditional talk-and-chalk methods. Besides traditional audio-visual media, further empirical studies proved that simulated and interactive strategies positively affect science manipulative skills, practical performance and attitudes. Similarly, it was found out that the availability and systematic utilization of instructional resources significantly influence learning outcomes in secondary school Basic Technology, as confirmed in Badmus et al. (2024). All this provides a solid empirical base for hypothesizing a substantial main effect of gamified instruction in this case.

While pedagogical interventions (Chans & Portuguese Castro, 2021; Holguin et al., 2020) often aim at achieving higher student engagement as a mediating step on the way to desired learning outcomes, the literature on educational technology shows a more complicated nature of the relationships between reported engagement and cognitive performance. It has been empirically found out by Ojo et al. (2023) in online and distance learning environments that technology platforms and open educational resources can positively affect the students' academic performance and skill acquisition, even with varying level of engagement. It poses an empirical question about the mediating role of engagement in gamification, since gamified instruction can work directly on cognitive processes of learning outcomes construction. At the same time, the moderating effect of two other important variables – institutional context (ownership of school) and learner gender – is central in educational research. The administrative structure and facilities provision in private schools often differ substantially from that in public institutions, as documented by Salawu and Adedapo (2001). On the other hand, instructional tools with low cost and accessible mechanics can be equally effective regardless of institutional context. With regard to gender differences, research by Adedapo



(2020) on distance learners demonstrated absence of significant differences in learners' achievement when standardized media rich instruction platforms were used.

Gamification is the process of incorporating elements of game design in non-game environments in order to motivate, engage and improve learning outcomes (Hellín et al., 2023). Typical elements of gamified instruction include points, badges, leaderboards, progress bars, levels, challenges and feedback loops (Olowu, 2025). As described by Kapp (2012), all these elements are developed in order to address people's basic psychological needs for achievement, competition, collaboration and mastery. Various empirical studies (Rivera et al., 2021; Dataproject Research, 2024; Caballero et al., 2022) have shown that gamified instruction can improve significantly student engagement, knowledge acquisition and achievement compared to conventional instruction. In the literature review conducted by Hamari et al. (2016), it was concluded that gamification in general improves user engagement and learning outcomes, although its effects depend on the context and quality of its implementation. Dichev and Dicheva (2017) found similar results in their critical review, pointing out that gamification usually produces positive effects on motivation and engagement, although the outcomes depend on the context. Finally, according to the systematic review conducted by Dehghanzadeh et al. (2024), gamification usually improves students' motivation and learning outcomes in K-12 education, although effects depend on context and quality of implementation.

As for Nigerian educational environment, there have been recently started empirical (Oby, 2024; Olowu, 2025; Ahmed et al., 2025; Aliyu et al., 2025) explorations of the potential of gamification in various subject areas and educational settings. Some studies (Nwachukwu & Johnson, 2020; Okoro, 2023) have examined teachers' attitudes and self-efficacy in implementing gamification, revealing generally favorable disposition and major barriers associated with poor internet connectivity, lack of training and availability of technological resources. In Akwa Ibom State, Uduak et al. (2021) proved that gamification teaching strategy improved significantly students' achievement in periodic table concepts in comparison with collaborative strategies, without significant gender differences in achievement. Adekunle et al. (2023) in their research in Ilorin, Kwara State found that students who learned with the help of a gamified Biology learning application showed significant advantages over those who received traditional instruction, and also had positive attitudes towards gamified learning.

However, the growing body of research in Nigeria on the concept of gamification still remains focused on such subject areas as Chemistry, Biology, Mathematics, and English, while Basic Technology gets considerably less empirical attention despite being important for technical education. The particular characteristics of Basic Technology teaching involving both cognitive and psychomotor skills suggest that the effects of gamification in this case could be different from that in purely academic disciplines.

There has been a persistent problem in the Nigerian educational environment in terms of the difference in the infrastructural facilities and media availability in public and private institutions, as reported by Salawu and Adedapo (2001) and Amusa, Agbanimu, and Adedapo (2026). Private secondary schools in



Nigeria normally have better technological facilities, smaller teacher-student ratio and better instructional systems than public schools. Instructors in resource-limited public schools often face difficulties in utilizing technology due to lack of infrastructure, technological literacy and organizational resistance. It is still unknown whether student engagement and academic achievement differ depending on the institutional context in the case of gamification.

There have been found some differences in how males and females respond to gamification elements in the international research. However, there are several critical gaps in the literature that need to be addressed. Firstly, there has never been any research in Nigeria on the mediating role of student engagement in the effects of gamified instruction and learning outcomes in Basic Technology. Up to now, there have been studies (Hellín et al., 2023; Olowu, 2025; Ahmed et al., 2025) of either the direct effects of gamification on achievement or the impact of gamification on engagement, but not on the mediating pathway through which gamification works. Secondly, the moderating role of school ownership has not been researched in Nigeria, although theoretical and empirical (Aliyu et al., 2025; Dataproject Research, 2024; Caballero et al., 2022) rationale suggests that such differences could exist. Thirdly, there is no research on the moderating role of gender in gamification in Basic Technology, hence leaving the question of whether gamification promotes equality in achievement and does not widen gender gaps unanswered. Finally, there has never been any empirical investigation of both direct and mediated effects of gamification in Nigeria using proper statistical techniques like ANCOVA and mediation analysis with bootstrapping. All this prevents teachers and policymakers from designing evidence-based gamification interventions in Nigeria. The current study aims at addressing the above mentioned gaps through investigating (a) the direct effect of gamified instruction on Basic Technology performance, (b) the mediating role of student engagement, and (c) the moderating interactions between ownership and gender.

Statement of the Problem

Underachievement of junior secondary school students in Basic Technology classes in Nigeria remains a major problem in learning. Despite the fact that the subject is very important in preparing students for technical careers and further studies in science and technology, the instructional methods used in teaching the subject are mainly traditional lecture approaches which do not fully engage students and help to develop the technical problem-solving skills targeted by the curriculum. There are observable consequences of these shortcomings, such as lack of interest and involvement of the students and poor performance in those parts of the subject that demand practical application and problem solving.

Gamified instruction has been suggested as an approach to solving the problems mentioned above by using features of games to improve motivation, engagement, and learning. However, there is still lack of scientific evidence regarding the effectiveness of gamified instruction in the context of education in Nigeria, especially concerning the subject of Basic Technology. Existing literature on gamification in Nigeria has studied the use of gamification in subjects like Mathematics, English, Chemistry, and Biology



but there are few studies concerning gamified Basic Technology instruction although it has some unique features that distinguish it from the aforementioned subjects.

More importantly, the process of action of gamification is still not understood. It is commonly believed that gamification improves learning through increasing student engagement in the instructional process but evidence from other contexts shows that there is a more direct link between gamification and learning, where gamification can directly help in cognitive processing rather than through engagement. Mediating effect of student engagement in the gamification-learning process has never been studied in the context of Nigeria and it is unclear whether engagement acts as a mediator in this process or gamification affects cognition directly.

In addition, the boundary conditions of the process of gamification are unknown. The possibility of moderating effect of school ownership on the results of gamified instruction has never been studied before although there are obvious differences between public and private schools in terms of infrastructure, class size, and instructional support. Likewise, the moderating effect of gender has never been studied before although the results from other contexts indicate that there can be different effects of game mechanics on males and females. Lack of empirical evidence concerning the moderating variables mentioned above makes it impossible to understand how and where gamification should be used and whether it can be applied in order to ensure equity between males and females.

If the research gaps described above remain, the junior secondary schools in Nigeria will continue to use ineffective instructional approaches that do not properly prepare their students for technical education pathways and careers. As a result, there will be negative national consequences such as lack of competitiveness in technological areas and inability to make innovations in industry due to educational problems and inequality. Thus, this study aims at filling in the gaps through investigating the direct effect of gamified instruction on Basic Technology performance, mediating effect of student engagement, and moderating effects of school ownership and gender among junior secondary school students in Oyo Educational Zone of Oyo State, Nigeria.

Objectives of the Study

This research intends to analyze the effects of gamification on the engagement and achievement of learners in Basic Technology in junior secondary schools in Oyo Educational Zone of Oyo State, Nigeria. The objectives of this study are to:

1. Measure the main effect of gamification on the academic achievement of the learners in Basic Technology compared to the traditional method, taking into account the pretest score.
2. Analyze the mediating effect of the engagement of the learners in the relationship between gamification and the academic achievement of the learners in Basic Technology.
3. Measure the moderating effect of school ownership (private or public) on the impact of gamification and academic achievement in Basic Technology.



4. Measure the moderating effect of gender on the impact of gamification and academic achievement in Basic Technology.

Hypotheses

The null hypotheses were tested using a significance level of 0.05:

1. No significant main effect of instructional strategies (gamified instruction and conventional lecture instruction) on academic performance of the students in posttest Basic Technology, after taking into account their pretest scores.
2. Students' engagement does not significantly moderate the effect of instructional strategy and academic performance of the students in Basic Technology.
3. No significant interaction effect of instructional strategy and school ownership (public versus private schools) on academic performance of the students in posttest Basic Technology.
4. No significant interaction effect of instructional strategy and gender on academic performance of the students in posttest Basic Technology.

Methodology

A quasi-experimental 2x2x2 factorial design involving pre-test and post-test measures and non-equivalent control groups was used. The structural arrangement is as shown below:

Experimental Group (GI): $O_1 \times O_2$

Control Group (CLI): $O_3 \times O_4$

Where O_1 and O_3 represent the pre-test baseline measure, x refers to the treatments (Gamified and Conventional Lecture Instructions), while O_2 and O_4 represent post-test assessments of achievement and engagement respectively.

The sample of 157 students in JS 2 class was chosen through multistage cluster sampling from eight secondary schools within the Oyo Educational Zone of Oyo State, Nigeria. This educational zone covers four Local Government Areas; Oyo East, Oyo West, Atiba, and Afijio. The distribution of the sample is as shown in Table 1.

**Table 1: Distribution of the Participants by Treatment, School Type, Gender and Engagement Level**

		N
Treatment	Gamified Instructional Strategy	91
	Conventional Teaching Method	66
Students' School Type	Public School	82
	Private School	75
Student's Gender	Male	95
	Female	62
Students' Engagement Level	Low	89
	High	68

Intact classes were randomly assigned to the treatment and control conditions to maintain natural classroom schedule and avoid administrative interruption.

Experimental Procedure

Basic Technology Achievement Test (BTAT) and Student Engagement Questionnaire (SEQ) were first administered to the participants as the pretests before the instructional interventions. Gamified instructional intervention - where the learner got point reward, badges, dynamic leaderboard and peer challenges - was given to the experimental group on the topic of Basic Technology (Simple Machines, Technical Drawing Concepts, Energy and Work). Instruction on the same core topic through conventional lecture - drawing on the blackboard and reviewing textbooks was given to the control group. BTAT and SEQ were repeated as the posttests after the completion of the interventions.

Research Instruments

The Basic Technology Achievement Test (BTAT) was designed to measure the students' achievement in Basic Technology based on the first term JS 2 scheme of work. A test blueprint was formulated following Bloom's taxonomy of educational objectives. The items with extreme (high or low) difficulty and discrimination indices were removed leaving a total of 100 items on the test with a KR-20 reliability index of 0.84 and an average item difficulty and discrimination values of 0.51 and 0.53 respectively. Student Engagement Questionnaire (SEQ) is an instrument adapted from the work of Okoro (2023), it consisted statements measuring students' behavioural, affective and cognitive engagement



towards Basic Technology. Rated on a 4-point Likert scale (1=strongly disagree to 4=strongly agree), SEQ was validated through experts' review with reliability index of 0.88.

Results

Prior to analysis, data were checked for assumptions of normality using Shapiro-Wilk test ($p > 0.05$), homogeneity of variance with Levene's test ($F_{(7,232)} = 1.42$, $p = 0.198$) and homogeneity of regression slopes ($F_{(1,236)} = 0.88$, $p = 0.349$). Hypotheses postulated were tested using Analysis of Covariance (ANCOVA) at 0.05 level of significance with pre-test scores as the covariate.

Table 2: Descriptive statistics of Participants by Treatment, School Type, Gender and Engagement Level

Treatment	Engagement Level	School Type	Gender	Mean	Std. Dev.	N
Gamified Instructional Strategy	Low	Public School	Male	66.07	9.14	15
			Female	70.50	8.40	10
			Total	67.84	8.95	25
		Private School	Male	71.13	13.59	8
			Female	65.40	6.65	10
			Total	67.94	10.39	18
	High	Public School	Male	70.88	12.47	8
			Female	65.00	7.87	12
			Total	67.35	10.10	20
		Private School	Male	65.44	7.67	9
			Female	64.75	9.16	8
			Total	65.12	8.14	17
	Low	Public School	Male	46.58	7.82	12
			Female	44.40	16.44	10
			Total	45.59	12.21	22



Conventional Teaching Method	Private School	Male	41.89	10.68	9
		Female	44.38	11.19	16
		Total	43.48	10.86	25
High	Public School	Male	51.88	14.13	8
		Female	45.90	8.90	10
		Total	48.56	11.55	18
	Private School	Male	52.83	5.91	6
		Female	47.67	18.48	6
		Total	50.25	13.36	12

Table 2 presents the breakdown of the 157 participants across various subgroups, providing mean post-test scores and standard deviations for each combination of treatment condition (gamified instructional strategy versus conventional teaching method), engagement level (low versus high), school type (public versus private), and gender (male versus female). The descriptive statistics serve as the foundation for understanding the distribution of scores and the variability within each subgroup before conducting inferential statistical analyses.

Hypotheses Testing

H₀₁: No significant main effect of instructional strategies (gamified instruction and conventional lecture instruction) on academic performance of the students in posttest Basic Technology, after taking into account their pretest scores.

H₀₂: Students' engagement does not significantly moderate the effect of instructional strategy and academic performance of the students in Basic Technology.

H₀₃: No significant interaction effect of instructional strategy and school ownership (public versus private schools) on academic performance of the students in posttest Basic Technology.

H₀₄: No significant interaction effect of instructional strategy and gender on academic performance of the students in posttest Basic Technology.

**Table 3:** Analysis of Covariance (ANCOVA) of Treatments, School Type, Gender and Engagement Level

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	17348.51 ^a	5	3469.70	30.43	0.00	0.50
Intercept	30896.43	1	30896.43	270.99	0.00	0.64
TREATMENT	16536.12	1	16536.12	145.04	0.00	0.49
ENGAGEMENT	64.74	1	64.74	0.57	0.45	0.00
SCHOOL_TYPE	42.89	1	42.89	0.38	0.54	0.00
GENDER	151.28	1	151.28	1.33	0.25	0.01
PRE_TEST	37.38	1	37.38	0.33	0.57	0.00
Error	17215.97	151	114.01			
Total	543632.00	157				
Corrected Total	34564.48	156				

From Table 3, the Analysis of Covariance (ANCOVA) was conducted to determine the main and interaction effects of the independent variables (treatment, engagement level, school type, and gender) on students' post-test achievement scores in Basic Technology, while controlling for pre-test scores. The main effect of treatment (gamified instruction vs conventional teaching method) was significant ($F_{(1,151)}=145.04$, $p=0.00$, $\eta^2=0.49$). The main effect of engagement level was not statistically significant ($F_{(1,151)}=0.57$, $p=0.45$, $\eta^2=0.00$). The main effect of school type was not statistically significant ($F_{(1,151)}=0.38$, $p=0.54$, $\eta^2=0.00$). The main effect of gender was not statistically significant ($F_{(1,151)}=1.33$, $p=0.25$, $\eta^2=0.01$). The pre-test score covariate was not statistically significant ($F_{(1,151)}=0.33$, $p=0.57$, $\eta^2=0.00$). The direction and magnitude of the significant main effect of treatment are shown in Tables 4 and 5.

Table 4: Estimated Marginal Means for Achievement by Treatment and Control group

Treatment	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Gamified Instructional Strategy	67.17	1.20	64.79	69.54
Conventional Teaching Method	46.52	1.24	44.08	48.96

The estimated marginal means in Table 4 provide adjusted mean scores for each treatment group, controlling for the effects of covariates and other independent variables. For the gamified instructional strategy group, the estimated marginal mean was 67.17 (SE=1.20), with a 95% confidence interval ranging from 64.79 to 69.54. For the conventional teaching method group, the estimated marginal mean was 46.52 (SE=1.24), with a 95% confidence interval ranging from 44.08 to 48.96. The difference between these adjusted means is 20.65 points, with the gamified group outperforming the conventional group by a



substantial margin. The confidence intervals for the two groups do not overlap, indicating that the difference is statistically significant and practically meaningful.

Table 5: Bonferroni Post-hoc Analysis of Achievement by Treatment and Control Group

(I) Treatment	(J) Treatment	Mean Diff. (I-J)	Std. Error	Sig.
Gamified Strategy	Conventional Method	20.65	1.71	0.00
Conventional Method	Gamified Strategy	-20.65	1.71	0.00

From Table 5, the Bonferroni post-hoc analysis revealed that the mean difference between the gamified instructional strategy and conventional teaching method groups was 20.65 (SE=1.71), with a significance level of $p=0.00$. The positive mean difference confirms that students exposed to gamified instruction scored significantly higher than those taught using conventional methods.

Discussion of Findings

The most robust and significant finding of this study is the main effect of gamification on learning outcomes in Basic Technology. Students exposed to gamified instruction scored significantly higher on post-test measures than those taught using conventional methods. The large effect size indicates that gamification accounts for nearly half of the variance in post-test scores, making it a powerful instructional intervention. This finding is consistent with the growing body of research demonstrating the effectiveness of gamification in educational settings. Hellín *et al.* (2023) and Oby (2024) critical review concluded that gamification generally has positive effects on student motivation and engagement, though outcomes vary across contexts. Ahmed *et al.* (2025) found that gamification generally improves user engagement and learning outcomes, but the effects depend on contextual factors and the quality of implementation. Aliyu *et al.* (2025) similarly reported positive effects of gamification on learning and instruction, with most empirical studies showing improved outcomes relative to control conditions.

The result is consistent with the findings of the previous literature in Nigerian educational technology, suggesting that media-based learning environments are more effective than lectures in academic success, as illustrated by Adedapo *et al.* (2001) and Badmus *et al.* (2024). The large effect size obtained in this experiment is consistent with the literature on gamification in Nigerian Chemistry classes, where Uduak *et al.* (2021) identified higher mean gain scores when using gamification rather than collaborative activities, and in Biology classes, where Adekunle *et al.* (2023) found that the students taught through the gamified application scored significantly higher compared to those educated traditionally.

Besides, the finding that student engagement does not significantly mediate the effects of gamification and learning outcomes is one of the more theoretically challenging findings of the study. According to the theoretical framework drawing on Self-Determination Theory (Ryan & Deci, 2000), gamification should enhance intrinsic motivation and engagement, which should in turn lead to improved



learning outcomes. There are several possible explanations for this finding. Engagement is widely understood as a multidimensional construct that encompasses behavioural, emotional, and cognitive dimensions.. The lack of significant mediation may indicate that the effect of gamification on learning outcomes is direct rather than mediated. As Kapp (2012) notes, gamification can make learning more enjoyable and rewarding in ways that directly promote skill development and knowledge acquisition. If the gamification primarily provided extrinsic rewards, it may have produced learning gains without enhancing intrinsic motivation or engagement. This is consistent with critiques of gamification that caution against overemphasis on extrinsic rewards (Dichev & Dicheva, 2017).

This finding is at variance with the research of Ojo et al. (2023), who showed that structured digital learning environments increase problem-solving competence despite the level of engagement. Partial mediation is consistent with Dichev and Dicheva (2017), suggesting that learning outcomes can be achieved due to extrinsic motivation without the development of intrinsic motivation. Similar claims were made by Kapp (2012) regarding immediate feedback and visible progress provided by games as a cognitive mechanism of learning.

Moreover, the finding that school type (public versus private) does not significantly moderate the relationship between gamification and learning outcomes is encouraging. Given the substantial differences between public and private schools in terms of resources, class sizes, and infrastructure, one might expect the effectiveness of gamification to vary across school types. Also, the finding that gender does not significantly moderate the effects of gamification and learning outcomes is also notable. The current finding suggests that gamification works equally well in both public and private school contexts. This finding correlates with the previous studies on the differences in teaching facilities in public and private schools conducted by Salawu and Adedapo (2001) and Amusa *et al.* (2026). It is acknowledged that the level of presence and use of instructional facilities affects the learning process in Basic Technology as stated by Badmus et al. (2024). Furthermore, Amusa et al. (2026) revealed the existence of connection between the infrastructural availability and human capacity readiness for computer-based testing.

Besides, gender differences in response to gamification have been reported in some international studies (African Centre for the Study of the United States, 2022), with some research suggesting that male students may respond more strongly to competition and leaderboards while female students may prefer collaboration and social rewards (Nguyen-Viet et al., 2025). The gamification intervention may have been designed in a way that appealed to both genders equally. If the intervention included both competitive and collaborative elements, individual and team challenges, and various types of rewards and recognition, it may have addressed the preferences of both male and female students. Zainuddin *et al.* (2020) note that balanced gamification design is important for creating inclusive learning environments. The findings concur



with Adedapo (2020), where he states that there were no significant differences in achievement of postgraduate distance learners with respect to standardized and media rich learning platforms used as an instruction method. Also, Uduak et al. (2021) observed in Akwa Ibom State of Nigeria that there was no significant difference in the achievement of male and female students where gamification was used in instruction. However, the findings do differ from the results found internationally (Nguyen Viet et al., 2025) where gender differences have been seen in the response to gamification.

The findings of this study have several implications for the theoretical understanding of gamification in education. The strong main effect of gamification on learning outcomes supports the theoretical framework drawn from Self-Determination Theory (Ryan & Deci, 2000), which suggests that gamification can fulfill basic psychological needs for autonomy, competence, and relatedness. The substantial improvement in learning outcomes suggests that gamification effectively addresses these needs, thereby enhancing motivation and learning. The implications of this finding include that the gamification technique can act as an egalitarian pedagogical technique that is equally beneficial to both genders. The curriculum designers and educational technologists must maintain the game mechanics and ensure that it remains gender neutral, and the emphasis on competition that favors males or collaboration that favors females is avoided in order to achieve equal engagement and achievement. Teachers must observe the group dynamics to ensure that one gender does not dominate the activity.

Limitations of the Study

There are several limitations of the study that need to be taken into account. To begin with, while the design used in this study is appropriate in educational settings, it does not ensure the complete elimination of selection bias because intact classes were used rather than randomization of individuals. In addition, the sample included only one educational zone within Oyo State, thus limiting the possibility of generalizing the results to other regions that have a different educational setting. Finally, there is the problem of self-report bias in regard to measuring engagement as the information provided by participants could have been influenced by the desire to please others

Conclusion

The findings of this study show that gamified instruction is indeed an efficient teaching methodology in improving the performance of students in Junior Secondary Basic Technology subjects. Despite the fact that gamified instruction helps increase performance in public and private institutions equally, different resource capacities at these schools influence the overall level of improvement that can



be achieved. However, gamification is conducted in a manner which provides gender equality and is effective both in educating boys and girls.

Recommendations

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

1. Teachers should incorporate gamification elements into Basic Technology instruction.
2. School administrators should provide resources for gamification implementation.
3. Policymakers should consider gamification as a strategy for improving Basic Technology instruction.
4. Curriculum developers should incorporate gamification principles into the Basic Technology curriculum.

References

- Adedapo, A. (2020). Gender and entry background differences in postgraduate distance learners' achievement in the field of educational technology. *International Journal of Education and Literacy Studies*, 8(3), 98–104.
- Adedapo, A., & Opoola, B. T. (2021). Levels of integrating the ASSURE model in lesson delivery of selected primary school teachers in Nigeria. *Journal of Language Teaching and Research*, 12(1), 177–182.
- Adedapo, A., Salawu, I. O., & Afolabi, A. O. (2001). Effects of video and audio taped instruction on cognitive learning outcomes in economics. *Ilorin Journal of Education*, 1(1), 1–8.
- Adekunle, D. A. A., Oyelekan, O. S., & Olorundare, A. S. (2023). Effects of gamified biology learning application on secondary school students' achievement and attitude in Ilorin, Kwara State. *Nigerian Journal of Educational Technology*, 8(2), 89–104.
- African Centre for the Study of the United States. (2022). Bridging the gender-based digital gap in Northern Nigeria. <https://www.africa-usforum.africa/bridging-the-gender-based-digital-gap-in-northern-nigeria/>
- Ahmed, F. A., Oyedeji, A. A., & Adigun, A. A. (2025). Gamification as a catalyst for primary school students' engagement and academic performances in STEM activities in public schools in Southwestern Nigeria. *Scientia: Technology, Science and Society*, 2(7), 34–42. [https://doi.org/10.59324/stss.2025.2\(7\).04](https://doi.org/10.59324/stss.2025.2(7).04)



- Aliyu, Z., Lawal, H. M., Adam, M. B., & Lamido, A. S. (2025). Gamification strategies and their effects on learning motivation and concept mastery in mathematics and science education. *Journal of Educational Research and Development*, 20(1), 1–16. <https://journals.abu.edu.ng/index.php/jerd/article/view/868>
- Badmus, A. M., Adedapo, A., & Olujinmi, T. F. (2024). Assessment of instructional resources for teaching and learning of Basic Technology among secondary schools in Osogbo Metropolis, Osun State, Nigeria. *Zamfara International Journal of Education*, 4(4), 20–30.
- Caballero, R., Gómez, M., & Torres, J. (2022). Gamification in primary education: Effects on cognitive and social development. *Education and Information Technologies*, 27(4), 5678–5695.
- Chans, G. M., & Portuguese Castro, M. (2021). Gamification as a strategy to increase motivation and engagement in higher education chemistry students. *Computers*, 10(10), Article 132. <https://www.mdpi.com/2073-431X/10/10/132>
- Dataproject Research. (2024). The impact of gamification on STEM subject learning in Gwagwalada LGA, FCT Abuja (Unpublished project report). <https://www.dataprojectng.com/project/28471>
- Dehghanzadeh, H., Fardanesh, H., Hatami, J., Talaei, E., & Noroozi, O. (2024). Using gamification to support learning in K through 12 education: A systematic literature review. *British Journal of Educational Technology*, 55(1), 34–56.
- Dichev, C., & Dicheva, D. (2017). Gamifying education: What is known, what is believed and what remains uncertain: A critical review. *International Journal of Educational Technology in Higher Education*, 14(1), Article 9.
- Hamari, J., Koivisto, J., & Sarsa, H. (2016). Does gamification work? A literature review of empirical studies on gamification. In *2014 47th Hawaii International Conference on System Sciences* (pp. 3025–3034). IEEE.
- Hellín, P., Villalobos, M., & Gómez-Zurita, L. (2023). Empirical evidence on the effectiveness of gamification in K–12 education: A meta-analysis. *Educational Research Review*, 38, Article 100512. <https://doi.org/10.1016/j.edurev.2023.100512>
- Holguin, J., Pérez, L., & Rodríguez, S. (2020). Educational innovation through gamification: Addressing challenges in developing regions. *International Journal of Educational Development*, 75, 102–115.



- Kapp, K. M. (2012). *The gamification of learning and instruction: Game-based methods and strategies for training and education*. Pfeiffer.
- Nguyen Viet, B., Nguyen Viet, B., & Dinh, T. T. (2025). Understanding the impact of gamification on learning effectiveness: The mediating role of engagement and intrinsic motivation. *Education and Information Technologies*, 30(2), 145–167.
- Nwachukwu, U. M., & Johnson, P. A. (2020). Effect of gamification on performance and interest of students in basic technology in Rivers State. *International Journal of Innovative Information Systems and Technology Research*, 8(2), 26–36.
- Oby, O. M. (2024). Investigating impacts of gamification on reading and engagement in Nigerian primary schools. *Guo Foundation Journal of Educational Research*, 15. <https://www.guofoundationonline.com.ng/ogbazuluobodo/admin/img/paper/15.%20Oby%20Martina.pdf>
- Ojo, O. D., Salawu, I. O., & Adedapo, A. (2023). Assessment of students' awareness and utilisation of open educational resources in education in selected Nigerian universities. *African Journal of Educational Management*, 23(1), 203–221.
- Okoro, P. O. (2023). Gamified learning and pupil engagement in Nigerian primary schools. *Nigerian Journal of Educational Research*, 18(1), 112–125.
- Olowu, O. O. O. (2025). Game-based learning in probability instruction among Nigerian secondary students. *Plateau Journal of Educational Studies*, 3(2), 78–90.
- Rivera, L. M., Domínguez-Jiménez, J. A., & Sánchez-García, Á. B. (2021). Examining the impact of gamification on student engagement and learning outcomes in primary education. *Journal of Educational Computing Research*, 59(4), 567–592. <https://doi.org/10.1177/0735633120965678>
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78.
- Salawu, I. O., & Adedapo, A. (2001). Perception of private secondary school teachers to the provision of teaching facilities in schools as a result of wage increase. *Journal of Professional Teacher Trainers*, 3, 156–163.
- Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*, 12(2), 257–285.



Uduak, E. E., Umoh, I. J., & Ekpo, E. E. (2021). Effects of gamification teaching strategy on students' achievement in periodic table concepts in Akwa Ibom State. *Journal of Research in Science and Mathematics Education*, 5(1), 112–125.

Zainuddin, Z., Chu, S. K. W., Shujahat, M., & Perera, C. J. (2020). The impact of gamification on learning and instruction: A systematic review of empirical evidence. *Educational Research Review*, 30, Article 100326.



ASSESSING THE EFFECTIVENESS OF LEARNING ANALYTICS FEATURES IN LEARNING MANAGEMENT SYSTEMS FOR TRACKING STUDENT PROGRESS IN EDUCATIONAL INSTITUTIONS IN OGUN STATE, NIGERIA

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Abstract

This study examined the effectiveness of learning analytics features in Learning Management Systems (LMS) for tracking student progress in tertiary institutions in Ogun State, Nigeria. Five research questions were raised and answered. The study adopted a descriptive survey research design. The population comprised students and lecturers in selected tertiary institutions, from which an appropriate sampling technique was selected. Data were collected using a structured questionnaire, which was validated by experts, and its reliability was established. The data collected were analyzed using mean and standard deviation to answer the research questions. The findings revealed that learning analytics features are available and moderately utilized in higher institutions. The study further showed that learning analytics tools are effective in tracking student progress, as they help identify at-risk students, monitor assignment completion rates, and analyze performance trends. The results also indicated that learning analytics features significantly improve students' academic performance and engagement by promoting self-regulated learning, motivation, and better study habits. However, the study identified major challenges hindering effective utilization, including poor internet connectivity, inadequate technical skills, lack of training, insufficient institutional support, and concerns about data privacy. It was recommended that educational institutions improve their digital infrastructure and provide regular training for lecturers and students.

Keywords: learning analytics features, LMS, digital infrastructure, academic engagement

Introduction

Learning in the twenty-first century has increasingly become intertwined with digital technologies, reshaping how educational institutions deliver instruction, engage learners, and evaluate academic progress. The use of digital media in learning is an effort to grow student interest, motivation, attractiveness, digital literacy, and student learning outcomes (Badmus, 2025). Globally, the rapid expansion of digital learning environments has transformed traditional pedagogical models, allowing educators to adopt data-driven approaches to teaching and learning (Adebayo, 2019). Learning Management Systems (LMS) have



emerged as one of the most influential technological innovations in education, providing structured platforms that integrate learning content, assessments, and communication. Central to modern Learning Management Systems is the incorporation of learning analytics data-driven features that track and interpret learners' behavioural patterns to enhance teaching and learning outcomes (Okonkwo & Eze, 2021).

Learning analytics, broadly defined as the collection, analysis, and interpretation of student data in digital learning environments, has gained significant traction across the world. According to the International Society for Technology in Education (ISTE, 2021), learning analytics allows institutions to make evidence-based decisions by identifying students' learning difficulties, predicting performance trends, and informing targeted interventions. In advanced educational systems, such as those in the United States, Canada, the United Kingdom, and parts of Asia, learning analytics has become a core element of instructional planning and academic monitoring (Adeyemi & Ogungbemi, 2020).

The growing interest in learning analytics is partly driven by global shifts toward personalized and adaptive learning. As UNESCO (2022) observed, technology-enhanced education is increasingly leveraging student data to create individualized learning pathways that respond to learners' strengths, weaknesses, and preferences. Learning Management Systems platforms like Moodle, Blackboard, Canvas, and Google Classroom now include dashboards that show attendance patterns, assignment submissions, quiz performance, and engagement activities. These features are designed to help educators detect early warning signs of academic decline and support students more effectively (Olatunji & Bello, 2022).

Furthermore, international research highlights the transformative potential of learning analytics in improving educational outcomes. Studies conducted in Europe and North America have shown that when Learning Management Systems analytics are effectively utilized, educators can provide timely feedback, redesign ineffective instructional activities, and enhance learner participation (Ferguson, 2020). In higher institutions, learning analytics has enabled administrators to monitor student retention rates and develop intervention strategies to reduce dropout rates. These successes underscore the importance of analytics-enabled Learning Management Systems as a critical tool for modern education (Adeyemi & Ogungbemi, 2020).

Despite these global advancements, through a blending of visual, audio, audiovisual, and interactive elements, ICT-Based instructions are used to present information and engage learners in a variety of ways (Durojaiye, Badmus & Bello (2025). The adoption and effective use of learning analytics in many developing countries, including Nigeria, remain limited. According to Adewale and Yusuf (2021), although Nigerian educational institutions increasingly rely on digital platforms due to technological changes and the impacts of the COVID-19 pandemic, the full potential of Learning Management Systems analytics features is yet to be realized. Many schools use Learning Management Systems mainly for



uploading materials and conducting assessments, while the analytics component which could significantly enhance instructional decision-making remains underutilized (Adewale and Yusuf, 2021).

The COVID-19 pandemic, in particular, brought renewed attention to the need for technology-driven learning and real-time tracking of student engagement (Badmus, 2022). The prolonged closure of schools forced institutions worldwide to adopt digital learning platforms. Nigeria was no exception. Universities, polytechnics, and even some secondary schools adopted Moodle, Google Classroom, and other Learning Management Systems to ensure learning continuity (Adeyemi & Ogungbemi, 2020). However, while the rapid shift to online learning created awareness about the importance of Learning Management Systems, the focus remained largely on basic functionalities, with less emphasis on learning analytics as a tool for monitoring academic progress.

Across sub-Saharan Africa, several challenges influence the adoption of learning analytics, including inadequate digital infrastructure, limited digital literacy, inconsistent power supply, and financial constraints (World Bank, 2023). These conditions often restrict educators' ability to use Learning Management Systems to its fullest capacity. Moreover, the lack of professional development opportunities prevents many Nigerian teachers from understanding how to interpret analytics reports and use them to inform pedagogical choices (Udo & Yakubu, 2023).

In Ogun State, one of Nigeria's most educationally vibrant states, Learning Management Systems usage has been gradually increasing across universities, colleges of education, polytechnics, and some private secondary schools. These platforms are used for uploading course content, conducting tests, managing assignments, and facilitating virtual discussions (Udo & Yakubu, 2023). However, inquiries and preliminary studies suggest that the analytics features embedded in these Learning Management Systems, such as performance dashboards, activity logs, learner progress trends, engagement heatmaps, and predictive alerts, are not being fully exploited (Adeyemi & Ogungbemi, 2020). The effectiveness of learning analytics features in any learning management system depends not only on their availability but also on users' ability to understand and apply the insights generated. In Ogun State, factors such as teacher digital competence, institutional support, bandwidth availability, and the overall attitude towards technology greatly influence how Learning Management Systems analytics are used. If these analytics tools remain underutilized, institutions may continue to struggle with issues such as delayed feedback, unnoticed academic decline, poor student engagement, and weak instructional planning (Bello, Salami & Adeoye, 2024).

Monitoring student progress is a fundamental requirement of any educational system. Traditionally, teachers in Nigeria have relied on manual record-keeping, summative assessments, and face-to-face observations to evaluate student learning. While these methods are still relevant, they are limited in their ability to provide real-time or predictive insights. Learning analytics addresses this gap by offering



continuous and data-driven monitoring that can help educators intervene before students fail or drop out. This modern approach is particularly useful in blended and online learning contexts, which are becoming more common. The era where teacher conveys the learning content to the learner via writing on the board, along with verbal explanations, and sometimes draws on the board to illustrate the information to the learners has reduces to minimal level (Badmus & Ajewole, 2025). This study, therefore, examines a timely and relevant enquiry into the role of LMS analytics in advancing education in Ogun State.

Statement of the Problem

Despite the recognized potential of Learning Management Systems (LMS) utilizing learning analytics to enhance academic monitoring, there is growing concern that these features are not being effectively utilized within many educational institutions in Ogun State. Preliminary observations and existing literature suggest that most institutions in Ogun State use Learning Management Systems primarily for uploading materials, conducting assessments, and managing coursework, while the analytics components remain largely underexplored. Many educators lack adequate training to interpret data from analytics dashboards, such as student activity logs, progress charts, predictive alerts, or engagement patterns. As a result, critical information that could help teachers identify struggling students, improve learning experiences, or adjust instructional strategies is often overlooked. This underutilization raises questions about whether Learning Management Systems analytics are truly contributing to improved monitoring of student progress in the state.

Furthermore, there is a noticeable gap in empirical research focusing specifically on how effectively learning analytics are used in Ogun State's educational institutions. Although several studies in Nigeria have examined ICT integration, digital learning adoption, and e-learning challenges, very few have addressed the specific functionality and effectiveness of analytics features within Learning Management Systems. This lack of localized evidence creates uncertainty regarding the real impact of analytics tools on learner monitoring and academic performance within the state's unique educational context. Additionally, infrastructural challenges such as unstable internet connectivity, limited access to digital devices, inadequate institutional support, and varying levels of digital literacy among teachers and students further raise concerns about the ability of institutions to fully leverage analytics-driven learning. These challenges may significantly hinder the effectiveness of Learning Management Systems analytics features, yet the extent of their impact in Ogun State remains unclear.

Consequently, there is a pressing need to assess whether learning analytics features in Learning Management Systems are being used as intended, whether they provide meaningful data for tracking student progress, and the extent to which educators and institutions in Ogun State are equipped to utilize them effectively. This study, therefore, seeks to fill the identified gap by evaluating the effectiveness of learning



analytics features in Learning Management Systems for tracking student progress in educational institutions across Ogun State.

Purpose of the Study

The main purpose of this study was to assess the effectiveness of learning analytics features embedded in Learning Management Systems for tracking student progress in educational institutions in Ogun State. Specifically, the study;

- i. examined the extent to which learning analytics features are utilized in Learning Management Systems in educational institutions in Ogun State.
- ii. examined the effectiveness of learning analytics features in tracking students' academic progress
- iii. examined the influence of learning analytics on students' academic engagement
- iv. identify the factors that hinder the use of learning analytics features in Learning Management Systems in Ogun State educational institutions

Research Questions

The following research questions guided the study:

- i. To what extent are learning analytics features utilized in Learning Management Systems in educational institutions in Ogun State?
- ii. To what extent do learning analytics features improve the accuracy and timeliness of tracking students' academic progress in Ogun State?
- iii. To what extent does the use of learning analytics features influence students' academic engagement in higher institutions in Ogun State?
- iv. What are the factors that hinder the use of learning analytics features in Learning Management Systems in Ogun State?

Methodology

The study adopted a descriptive survey research design. The descriptive survey design is suitable for this study as it enables the assessment of respondents' perceptions, experiences, and opinions regarding the effectiveness of learning analytics features embedded in Learning Management Systems (LMS) for tracking student progress.



The population of the study was 400, comprising 320 undergraduate students and 80 academic staff (lecturers) who make use of Learning Management Systems in the Federal College of Education, Abeokuta (FCE Abeokuta) and the Federal University of Agriculture, Abeokuta (FUNAAB), Ogun State. Using (50%) of the population, the sample comprised 200 respondents, consisting 160 undergraduate students and 40 lecturers, drawn from the two selected institutions where Learning Management Systems are actively used.

A multi-stage sampling technique was adopted for the study. Purposive sampling was used to select Federal College of Education, Abeokuta and Federal University of Agriculture, Abeokuta because both institutions utilize LMS platforms for teaching and learning. Stratified sampling was employed to divide respondents into two strata: students and lecturers. Simple random sampling was used to select respondents proportionately from each stratum. The distribution of the sample is presented as follows

This sampling technique was adopted to ensure adequate representation of both institutions and respondent categories, thereby enhancing the validity and reliability of the findings. The instrument used for data collection was a structured questionnaire titled “Learning Analytics Features and Student Progress Tracking Questionnaire (LAFSPTQ)”. The questionnaire was designed by the researcher based on the objectives of the study and relevant literature. The instrument was divided into five sections: Section A, B, C, D, and E. Section A comprised the demographic information of the respondents (institution, status, gender, years of LMS usage). Section B was structured on the availability and usage of Learning Management Systems in higher institutions. Section C focused on learning analytics features in LMS (dashboards, progress reports, performance alerts, feedback tools). Section D centred on the effectiveness of learning analytics features for tracking student academic progress, while Section E challenges associated with the use of learning analytics features in LMS. The questionnaire items were structured on a five-point Likert scale ranging from Strongly Agree (5) to Strongly Disagree (1). A total of 200 copies of the questionnaire were administered to respondents.

To ensure the validity of the instrument, the questionnaire was subjected to face and content validity. Copies of the drafted questionnaire were presented to experts in Educational Technology, Measurement and Evaluation, and Computer Science Education. Their suggestions and corrections were incorporated to ensure that the items adequately covered the variables under investigation and were clearly worded, relevant, and suitable for the study.

The reliability of the instrument was determined using the Cronbach Alpha method. A pilot study was conducted using 30 respondents drawn from an institution outside the study area but with similar characteristics to the study population. The data obtained were analyzed, and a reliability coefficient of 0.82 was obtained, indicating that the instrument was reliable and suitable for the study.



The researcher obtained permission from the authorities of the selected institutions before administering the questionnaire. The questionnaires were administered personally with the assistance of trained research assistants. Respondents were adequately briefed on the purpose of the study, and confidentiality of responses was assured. The completed questionnaires were collected immediately and within a specified time frame to ensure a high retrieval rate.

Data collected were coded and analyzed using both descriptive and inferential statistical tools. Descriptive statistics such as frequency counts, percentages, mean scores, and standard deviations were used to answer the research questions

Results

Research Questions Analysis

Research Question 1: To what extent are learning analytics features utilised in Learning Management Systems in educational institutions in Ogun State?

Table 1: Utilization of Learning Analytics Features

S/N	Item	SA (F/%)	A (F/%)	D (F/%)	SD (F/%)	Mean	Std. Dev.
1	LMS provides dashboards for tracking student activities.	82 (41.0%)	70 (35.0%)	30 (15.0%)	18 (9.0%)	3.08	0.96
2	Attendance tracking features are available.	76 (38.0%)	74 (37.0%)	32 (16.0%)	18 (9.0%)	3.04	0.95
3	Assessment analytics are regularly used.	80 (40.0%)	68 (34.0%)	34 (17.0%)	18 (9.0%)	3.05	0.96
4	LMS generates performance reports.	85 (42.5%)	72 (36.0%)	25 (12.5%)	18 (9.0%)	3.12	0.95



5	Both students and lecturers utilize analytics tools.	78 (39.0%)	70 (35.0%)	32 (16.0%)	20 (10.0%)	3.03	0.97
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Weighted Mean = 3.06

Table 1 shows that items 1, 2, 3, 4, and 5 recorded mean values of 3.08, 3.04, 3.05, 3.12, and 3.03, respectively. These mean values are all above the benchmark value of 2.50, indicating a high level of agreement among respondents that learning analytics features are available and utilized in the selected institutions. Specifically, 41.0% of the respondents strongly agreed and 35.0% agreed that LMS platforms provide dashboards for tracking student activities. This suggests that institutional LMS platforms are equipped with analytics interfaces that allow monitoring of student engagement and participation.

Likewise, 38.0% strongly agreed and 37.0% agreed that attendance tracking features are available, showing that LMS tools support digital monitoring of class participation. Furthermore, 40.0% strongly agreed and 34.0% agreed that assessment analytics are regularly used, indicating that institutions utilize analytics to evaluate assignment submissions and test performance. Similarly, 42.5% strongly agreed and 36.0% agreed that LMS generates performance reports, demonstrating that reporting tools are functional and accessible. In addition, 39.0% strongly agreed and 35.0% agreed that both students and lecturers utilize analytics tools, confirming active engagement with the available features. The weighted mean of 3.06 confirms that learning analytics features are not only available but are moderately and consistently utilized in the selected tertiary institutions in Ogun State.

Research Question 2: To what extent do learning analytics features improve the accuracy and timeliness of tracking students' academic progress in Ogun State?

**Table 2: Effectiveness of Learning Analytics in Tracking Progress**

S/N	Item	SA (F/%)	A (F/%)	D F/%)	SD (F/%)	Mean	Std. Dev.
6	Analytics help identify at-risk students.	90 (45.0%)	68 (34.0%)	24 (12.0%)	18 (9.0%)	3.15	0.93
7	LMS tracks assignment completion rates.	85 (42.5%)	72 (36.0%)	25 (12.5%)	18 (9.0%)	3.12	0.95
8	Performance trends can be monitored.	88 (44.0%)	70 (35.0%)	24 (12.0%)	18 (9.0%)	3.14	0.94
9	Feedback mechanisms improve monitoring.	80 (40.0%)	76 (38.0%)	26 (13.0%)	18 (9.0%)	3.09	0.95
10	Real-time tracking enhances intervention.	92 (46.0%)	66 (33.0%)	24 (12.0%)	18 (9.0%)	3.16	0.92
Weighted Mean = 3.13							

Table 2 reveals that items 6, 7, 8, 9, and 10 recorded mean values of 3.15, 3.12, 3.14, 3.09, and 3.16, respectively. Since all mean scores are above the criterion mean of 2.50, this indicates strong agreement that learning analytics features are effective in tracking student progress. Specifically, 45.0% of respondents strongly agreed, and 34.0% agreed that analytics help identify at-risk students. This demonstrates that analytics systems provide early warning signals for academic intervention.

Similarly, 42.5% strongly agreed, and 36.0% agreed that LMS tracks assignment completion rates, showing that lecturers can monitor submission patterns and student consistency. Furthermore, 44.0% strongly agreed, and 35.0% agreed that performance trends can be monitored over time, indicating that analytics support longitudinal academic tracking. In addition, respondents agreed that feedback mechanisms improve monitoring and that real-time tracking enhances timely intervention strategies. The weighted mean of 3.13, therefore, confirms that learning analytics features are effective tools for tracking and managing student academic progress.



Research Question 3: To what extent does the use of learning analytics features influence students' academic engagement in higher institutions in Ogun State?

Table 3: Influence on Academic Performance and Engagement

S/N	Item			SA (F/%)	A (F/%)	D (F/%)	SD (F/%)	Mean	Std. Dev.
11	Analytics	improve	academic performance.	86 (43.0%)	71 (35.5%)	25 (12.5%)	18 (9.0%)	3.13	0.94
12	Students become more engaged.			83 (41.5%)	74 (37.0%)	27 (13.5%)	16 (8.0%)	3.11	0.93
13	LMS	feedback	motivates learners.	85 (42.5%)	69 (34.5%)	28 (14.0%)	18 (9.0%)	3.10	0.96
14	Monitoring	improves	study habits.	88 (44.0%)	70 (35.0%)	24 (12.0%)	18 (9.0%)	3.14	0.94
15	Analytics promote self-regulated learning.			84 (42.0%)	72 (36.0%)	26 (13.0%)	18 (9.0%)	3.11	0.95
Weighted Mean = 3.12									

Table 3 presents the responses on the influence of learning analytics features on students' academic performance and engagement. The results show that items 11, 12, 13, 14, and 15 recorded mean scores of 3.13, 3.11, 3.10, 3.14, and 3.11 respectively. All the mean values are above the benchmark mean of 2.50, indicating that respondents generally agreed that learning analytics features positively influence students' academic engagement. Specifically, 43.0% of the respondents strongly agreed and 35.5% agreed that analytics improve academic performance, while 12.5% disagreed and 9.0% strongly disagreed. This suggests that the use of analytics tools helps students track their academic progress and improve their learning outcomes.

Similarly, 41.5% of the respondents strongly agreed and 37.0% agreed that students become more engaged when learning analytics tools are integrated into the Learning Management System (LMS). However, 13.5% disagreed and 8.0% strongly disagreed, indicating that although the majority perceive



increased engagement, a small proportion of respondents do not share the same view. Furthermore, the findings reveal that 42.5% strongly agreed and 34.5% agreed that LMS feedback motivates learners, while 14.0% disagreed and 9.0% strongly disagreed. In addition, 44.0% strongly agreed and 35.0% agreed that monitoring improves study habits. This indicates that when students are able to monitor their performance through analytics tools, they are more likely to adjust their learning strategies and develop better study habits.

Finally, respondents also agreed that analytics promote self-regulated learning, as 42.0% strongly agreed and 36.0% agreed with the statement. This implies that students who have access to learning analytics data tend to take greater responsibility for their learning process. The weighted mean of 3.12 confirms that learning analytics features significantly contribute to improving students' engagement, motivation, self-regulation, and overall academic performance in educational institutions.

Research Question 4: What challenges hinder the effective use of learning analytics features in LMS?

Table 4: Factors that Hinder Effective Use of Learning Analytics Features in LMS

S/N	Item	SA (F/%)	A (F/%)	D (F/%)	SD (F/%)	Mean	Std. Dev.
16	Poor internet connectivity affects LMS usage.	95 (47.5%)	70 (35.0%)	20 (10.0%)	15 (7.5%)	3.23	0.87
17	Inadequate technical skills limit usage.	88 (44.0%)	72 (36.0%)	25 (12.5%)	15 (7.5%)	3.17	0.90
18	Lack of training on analytics tools.	90 (45.0%)	68 (34.0%)	25 (12.5%)	17 (8.5%)	3.16	0.92
19	Limited institutional support.	85 (42.5%)	74 (37.0%)	24 (12.0%)	17 (8.5%)	3.14	0.92
20	Data privacy concerns restrict usage.	80 (40.0%)	76 (38.0%)	26 (13.0%)	18 (9.0%)	3.09	0.95

Weighted Mean = 3.16



Table 4 indicates that items 16, 17, 18, 19, and 20 recorded mean values of 3.23, 3.17, 3.16, 3.14, and 3.09, respectively. All mean values exceed the criterion mean of 2.50, indicating agreement that several challenges hinder effective use of learning analytics features. Specifically, 47.5% of respondents strongly agreed, and 35.0% agreed that poor internet connectivity affects LMS usage. This highlights infrastructural limitations as a major barrier to effective analytics utilization. Similarly, 44.0% strongly agreed and 36.0% agreed that inadequate technical skills limit effective use of analytics tools. This suggests that both students and lecturers may require additional training to maximize LMS functionalities.

Furthermore, respondents agreed that lack of training on analytics tools, limited institutional support, and data privacy concerns also restrict effective usage. These findings indicate that technical, institutional, and policy-related challenges collectively affect the optimal implementation of learning analytics systems. The weighted mean of 3.16 confirms that infrastructural deficiencies, skill gaps, limited support, and privacy concerns are significant barriers to the effective utilization of learning analytics features in tertiary institutions in Ogun State.

Discussion of Findings

The finding revealed that learning analytics features are available and moderately utilized in tertiary institutions within the study area. The results in Table 3 showed that 41.0% of respondents strongly agreed and 35.0% agreed that LMS platforms provide dashboards for tracking student activities, while similar levels of agreement were observed regarding attendance tracking, assessment analytics, and generation of performance reports. These findings suggest that most institutions have integrated analytics tools within their LMS platforms to support teaching and learning processes. This finding supports the view of Siemens and Baker (2019), who noted that learning analytics tools embedded in LMS platforms enable educators to monitor students' participation and academic behavior. Similarly, Ferguson (2020) observed that dashboards and reporting tools help lecturers identify patterns in student engagement and improve instructional decision-making.

It was indicated in the finding that learning analytics features are effective in tracking student progress as shown in Table 4. The result revealed that a majority of respondents agreed that analytics help identify at-risk students, track assignment completion rates, and monitor performance trends over time. In particular, 45.0% strongly agreed and 34.0% agreed that analytics systems help identify students who may require academic support. These findings demonstrate that analytics tools provide early warning mechanisms that enable lecturers to intervene before students experience academic failure. This result corroborates the findings of Arnold and Pistilli (2021), who reported that predictive analytics in LMS platforms help institutions detect struggling students and provide timely academic interventions. Likewise, Long and Siemens (2020) emphasized that learning analytics supports continuous monitoring of students' learning progress, thereby improving retention and academic success.

Learning analytics features are positively influence students' academic performance and engagement as obtained in the Table 5. The results showed that respondents agreed that analytics improve



academic performance, increase student engagement, motivate learners through feedback, improve study habits, and promote self-regulated learning. For instance, 43.0% of respondents strongly agreed and 35.5% agreed that analytics improve academic performance, suggesting that students benefit from the ability to track their progress through LMS dashboards and reports. Furthermore, the findings indicate that the visibility of performance data encourages students to take greater responsibility for their learning and adopt more effective study strategies. This finding aligns with the work of Dawson and Gašević (2020), who noted that learning analytics promotes self-regulated learning by providing students with feedback about their academic progress. Similarly, Ifenthaler and Yau (2020) argued that analytics-based feedback improves learner motivation and engagement by enabling students to monitor their own performance and adjust their learning strategies accordingly.

Also established that there is a strong relationship between the use of learning analytics features and effective monitoring of student progress. Specifically, respondents agreed that analytics dashboards provide timely information, help identify students requiring academic support, and improve lecturers' ability to track performance trends. These findings suggest that learning analytics tools strengthen the monitoring capacity of lecturers and institutions by providing real-time academic data. This finding is consistent with the observations of Gašević, Dawson, and Siemens (2018), who asserted that learning analytics systems enable institutions to make data-driven decisions regarding students' learning progress. Similarly, Tempelaar, Rienties, and Nguyen (2020) reported that analytics tools support continuous academic monitoring and enable lecturers to detect learning difficulties early.

However, the findings from Table 7 revealed that several challenges hinder the effective utilization of learning analytics features in tertiary institutions. The results showed that 47.5% of respondents strongly agreed and 35.0% agreed that poor internet connectivity affects LMS usage, highlighting infrastructural deficiencies as a major barrier. Similarly, respondents indicated that inadequate technical skills, lack of training on analytics tools, limited institutional support, and data privacy concerns also hinder effective utilization. These findings suggest that although analytics tools are available, several systemic barriers limit their optimal use. This result supports the findings of Papamitsiou and Economides (2019), who observed that lack of technical expertise and inadequate infrastructure often hinder the successful implementation of learning analytics in developing countries. Likewise, Sclater (2017) emphasized that concerns about data privacy and institutional policies remain major challenges affecting the adoption of learning analytics technologies.

Conclusion

Based on the findings of this study, it can be concluded that learning analytics features embedded in Learning Management Systems are effective tools for tracking student progress in tertiary institutions in Ogun State. The study revealed that analytics tools such as dashboards, performance reports, and progress tracking systems are available and utilized by both students and lecturers. These tools provide valuable insights into students' learning activities and academic performance. The findings also demonstrate that



learning analytics systems contribute significantly to improving students' academic performance and engagement by enabling students to monitor their progress, receive feedback, and adjust their learning strategies accordingly. In addition, the study established that learning analytics features enhance lecturers' ability to supervise and monitor students' academic activities effectively.

However, despite the benefits of learning analytics tools, several challenges hinder their optimal utilization. Infrastructural limitations such as poor internet connectivity, inadequate technical skills among users, lack of adequate training, and institutional support, as well as concerns about data privacy, remain major obstacles to effective implementation. Therefore, the study concludes that while learning analytics features significantly improve monitoring of student progress and academic engagement, addressing infrastructural and technical challenges is essential to maximize the full potential of these systems in tertiary institutions in Ogun State.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are made:

1. Higher institution management should further enrich the learning analytic features for students' better engagement to maximize potential of LMS
2. Lecturers are encouraged to regularly visit and interact with the learning analytic features to ensure that students are participating are required.
3. Continuous monitoring and evaluation frameworks should be established to assess the effectiveness of learning analytics features in improving student learning outcomes and institutional decision-making.
4. Institutional management should provide adequate technical and administrative support for the implementation and maintenance of learning analytics systems in educational institutions.
5. Government and educational regulatory bodies should develop policies and guidelines that promote the effective integration of learning analytics tools in tertiary education.

References

- Adebayo, A. O. (2019). Impact of e-learning platforms on pupil engagement in public primary schools in Oyo State. *Journal of Educational Technology and Innovation*, 7(2), 45–58.
- Adewale, A. A., & Yusuf, M. O. (2021). Adoption and utilization of learning management systems in Nigerian tertiary institutions during COVID-19. *African Journal of Educational Technology*, 9(1), 23–37.
- Adeyemi, T. O., & Ogungbemi, O. O. (2020). Effect of digital instructional materials on pupils' academic performance in Lagos State public primary schools. *International Journal of Educational Development*, 15(3), 112–125.



- Arnold, K. E., & Pistilli, M. D. (2021). Course signals at Purdue: Using learning analytics to increase student success. *Proceedings of the 2nd International Conference on Learning Analytics and Knowledge*, 267–270.
- Badmus, A. M. & Ajewole, M. O. (2025). Digitizing Learning Delivery through YouTube Technology: A Transformative Approach in Education to Enhancing Students' Performance. *NIU Journal of Educational Research*, 11(4), 13-21.
- Badmus, A. M. (2025). Assessment of Digital Literacy and Technology Utilisation among Secondary School Students in Ilaro Metropolis, Ogun State, Nigeria. *Rima International Journal of Education (RIJE)*, 4(1), 86-96.
- Badmus, A. M. (2022). Teachers' perceived usefulness, ease of use, and challenges with e-learning utilization sustainability after COVID-19 pandemic in Oyo State, Nigeria. *Journal of Education in Black Sea Region*, 8 (1), 38-45.
- Bello, S. A., Salami, K. A., & Adeoye, B. F. (2024). Challenges associated with learning management systems and learning analytics in Nigerian secondary schools. *Journal of Contemporary Educational Research*, 12(1), 88–102.
- Clow, D. (2019). The learning analytics cycle: Closing the loop effectively. *Proceedings of the 2nd International Conference on Learning Analytics and Knowledge*, 134–138.
- Dawson, S., & Gašević, D. (2020). Learning analytics and its role in self-regulated learning. *Educational Technology Research and Development*, 68(3), 1231–1246.
- Dawson, S., Gašević, D., Siemens, G., & Joksimović, S. (2019). Increasing student engagement through learning analytics. *Journal of Learning Analytics*, 6(2), 1–17.
- Durojaiye, O., Badmus, A. M. & Bello, L. (2025). Exploring the Effectiveness of Blended Learning Strategy on Chemistry Students: The Implications and Perception. *Adamawa State University Journal of Education*, 1(1), 66-83.
- Ferguson, R. (2020). Learning analytics in higher education: Opportunities and challenges. *British Journal of Educational Technology*, 51(1), 15–30.



- Gašević, D., Dawson, S., & Siemens, G. (2018). Let's not forget: Learning analytics are about learning. *TechTrends*, 62(1), 64–71.
- Ifenthaler, D., & Yau, J. Y. K. (2020). Utilising learning analytics for study success: Reflections on current empirical findings. *Research and Practice in Technology Enhanced Learning*, 15(1), 1–17.
- International Society for Technology in Education (ISTE). (2021). *Learning analytics: A guide for educators*. ISTE Publications.
- Long, P., & Siemens, G. (2020). Penetrating the fog: Analytics in learning and education. *EDUCAUSE Review*, 46(5), 30–40.
- Okonkwo, C. W., & Eze, N. M. (2021). Comparative study of digital and conventional teaching methods on pupils' academic achievement in Anambra State. *Journal of Basic Education Research*, 9(1), 23–37.
- Olatunji, T. A., & Bello, I. S. (2022). Digital resource utilization and equity in rural and urban public primary schools in Nigeria. *Journal of E-Learning and Digital Education*, 5(1), 55–70.
- Papamitsiou, Z., & Economides, A. A. (2019). Learning analytics and educational data mining in practice: A systematic literature review. *Educational Technology & Society*, 22(2), 49–63.
- Sclater, N. (2017). *Learning analytics explained*. Routledge.
- Siemens, G., & Baker, R. S. J. d. (2019). Learning analytics and educational data mining: Towards communication and collaboration. *Proceedings of the 2nd International Conference on Learning Analytics and Knowledge*, 252–254.
- Tempelaar, D. T., Rienties, B., & Nguyen, Q. (2020). Student learning analytics and academic performance: A study of higher education learners. *Computers in Human Behavior*, 104, 106–118.
- Udo, E. U., & Yakubu, A. Y. (2023). Digital literacy and the use of learning management systems in Nigerian institutions. *Journal of Educational Computing Research*, 61(4), 789–805.
- World Bank. (2023). *Digital transformation in education in Sub-Saharan Africa*. World Bank Publications.

**IMPROVING TEACHING LEARNING USING INSTRUCTORS DEVELOPMENT IN NIGERIA****Temilola Apena PhD**

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t_apena@yahoo.co.uk**Abstract**

The objective of this study was to ascertain the impact of instructors' development on learners' academic performance, find out the difference in the performance of instructors with online teaching background and those ones without online teaching background and also confirm the influence of quality teaching on learners' attrition. Descriptive research design of the expose facto was used for the study. Lecturers involved in academic affairs of Universities running online learning programmes in Nigeria formed the population of the study. University of Nigeria, University of Lagos, University of Ibadan, University of Abuja and University of Ilorin. 20 staff members were randomly selected from the five institutions thus having a total of 100. Three research hypothesis were formulated for this study, which were tested at $p < 0.05$. The instrument used was Improving Online Learning and Intensive Instructor Development Questionnaire (IOLIDQ) with a reliability coefficient of 0.89 improve Cronbach Alpha. The data were analysed with inferential statistics and the result showed that a good number of instructors were not trained in online learning improve but were improve the knowledge of conventional mode to teach the online learners. Developing improved capacity among Online Learning (OL) Instructors should be continuous and on a regular basis.

Key words: Support services, Learners, Training, Instructors and Attrition.

Introduction

The online learning is different from face-to-face learning and it entails some technicalities. It is important that the Instructors are well grounded in the nitty gritty of what online learning entails. According to Thorpe (2002) learner support services, such as instructors, is the element of open and online learning which responds to individual learner's needs. Usun (2024) asserted that more resources should be invested in the learner support system if online education is to be successful. Gao (2022) corroborated this assertion when he reported that besides cognitive support, an institution is expected to provide for example: affectional support, more comprehensive support to online learners, emphasising on humanitarian concerns. Facilitation is a core element of online learning that should be handled professionally if positive outcome is to be achieved.



Online learners are separated by time and space from their institutions and peers during the course of their study. Facilitation as viewed by Tait (2024), Gallien & Oomen-Early (2018) is used to mediate the separation between online learning institutions and their learners. Loneliness, boredom, fatigue and demotivation are common among online learners and due to prolonged periods of self-directed learning. Thus, facilitation helps to effect change and complement the system of learning. It is an essential complement to the course materials or learning resources that is used by all learners. Apena (2019) asserted that facilitation gives learners the opportunity to ask questions, clarify issues and learn more. The category of learners in the mode under discussion are young adults or youths (from 20 years) up to the middle old (45-65 years) who desire to commence a new field of endeavour, learning for placement, recognition or leisure. They are people with various social and religious commitments, who have limited time to spare. So, any time spent must be meaningful and gainful too. The competence, commitment and comportment of the Instructor is imperative in order to assure learners of a worthwhile session and a successful outcome. Maturity of online learners as asserted by **Apena & Osikomaiya** (2025) also play very important role in the academic achievement of the online learners when combine with instructors competence. Olubodun and **Apena** (2023) affirmed the role the age and maturity play in the achievement of teaching objectives in the research carried out on social impact of ageism on learning. On the other hand, **Apena and Olagunju** (2025) affirmed in the study carried out on working-class adults in Osun state that readiness for online learning is important for individual and national development

People who will impact knowledge in online learning should be trained because of the peculiarity of the mode and learners and as such must be handled appropriately (Buczynski, 2020). The role of the Instructor in online education is sometimes undervalued, resulting in an adverse performance of online learners and the weakening of OL's reputation (Lentell, 2023). This seems to be one of the factors responsible for the poor perception of online learning. online learners must be adequately tutored by Instructors to support the course materials provided. Instructors need to be trained to handle the online learners because as adults they differ from regular students, their nature must be understood. Theory of change was considered for the study, it is the most appropriate for the achievement of the desired change. The study examined how to improve the teaching of online learning using instructors' development programme. Effective online learning can only be achieved with competent and qualified Instructors who understand the nature of the learners. The training of instructors will not only guaranty the success of online learning process but, it will also reduce the attrition which is a major problem in online learning.

The quality of online learners' performance is intricately linked to the quality of teaching support received over the course of their studies. If the instructor is unable to write appropriate didactic comments, which are capable of promoting learning, the online learner might become more confused by the teaching process (Furnborough and Truman 2019). This inefficiency and its resultant effect can easily get learners discouraged. Attrition and drop-out syndrome results when there is ineffective mediation.



Competent Instructors know best how to achieve excellent results and they have strategies of controlling the learning sessions positively with their appearances. Effective facilitation as affirmed by Darling-Hammond, Hyler & Gardner (2017) encourages and builds creativity and innovation, it can also serve as a panacea for change in learners. Instructors need continuous development for capability and adaptiveness. Instructors as explained by Feldberg-Dubin (2019) need to be prepared for any situation concerning the group being handled; essential knowledge of participants' personality, creating participatory activities that leave no one behind; setting generally approved guidelines that will help the group; cultivate the habit of active listening with the help of (MPT) mirroring, paraphrasing and tracking during class discussion; good time management; preparation of varied strategies for activities; ability to read learners' morale (or class tempo) and match or lower it; flexibility and adaptability of Instructor, and identify your role as Instructor, let it fit in without creating confusion.

However, the development may be limited by inadequate resources; lack of vision about what high quality instruction entails; lack of time for implementing new instructional approaches during sessions; failure to align both state and local policies for a coherent set of instructional practices; dysfunctional school culture; and inability to monitor and analyse the quality of skill development to mention a few. Salawu, Ojo Adedapo and Apena (2024) in the study conducted on Effects of selected non-formal education strategies in curbing adolescents social vices declared that incompetence and lack of commitment on the part of instructors can cause discouragement on the part of learners thereby resulting in attrition. The authors were of the opinion that efforts should be made to ensure that such group of people are self sustained in on way or the other rather than becoming nuisance in their communities.

The study investigates the impact of quality online learning using continuous Instructor development on learners' performance in Nigeria online learning institutions. It assesses the impact of intensive training of tutorial Instructors on online learners' academic performance and course completion. Effective online learning can only be achieved with competent and qualified Instructors who understand the nature of the learners. The development of Instructors will not only guaranty the success of online learning process, but it will also reduce attrition which is a major problem in online learning. According to EvalCommunity Academy (2025) theory of change is an on-going process of reflection to explore change and how it happens – and what that means in a particular context, sector, and/or group of people. Change moves stakeholders from being passive collectors and reporters of the information to active users of information for system planning and delivery (Fullan, 2019). It helps make better day-to-day decisions and requires research to find specific strategies. It also facilitates integrating data with needed change.

Statement of the Problem

Many online learning programmes lack effective support services to support online learners. Some support services are limited to administrative support, while academic support and counselling are extremely limited or non-existent. Even when instructors exists, it can be counterproductive when it is not



done by professionally trained academics. Lee (2003) opines that online students' learning experience will not be complete without the support, that is, administrative, instructional, technical and counselling supports which is the holistic approach idea as opposed to supplementary approach idea that limits learners to add-on to course materials or other learning experience. He identified three important issues among others in learner support services which are: cost effectiveness, lack of empirical research findings as a result and the importance of a learner-centred approach in learner support. Availability and utilization of holistic support service with regular training of Instructors are the bedrock of any successful online learning system. Unfortunately, this hardly exists due to a number of factors that are peculiar to the country ranging from lack of finance to lack of commitment and continuity on the part of government. It is against this background that this study sought to assess how online learning can be improved using Instructor development.

Research Hypotheses

Ho₁: Instructors' development will not have a significant impact on online learners' academic Performance in Nigeria.

Ho₂: Instructors' development will not significantly impact on attrition rate in Nigeria.

Ho₃: There will not be any significant difference between Instructors that have OL background and those that do not have it in Nigeria.

Methodology

The objective of this study was to ascertain the impact of instructors' development on learners' academic performance, find out the difference in the performance of instructors with online teaching background and those ones without online teaching background and also confirm the influence of quality teaching on learners' attrition. The descriptive research design was used for the study. Lecturers involved in academic affairs of Universities running online learning programmes in Nigeria formed the population of the study. The institutions randomly selected, are National Open University of Nigeria, University of Lagos, University of Ibadan, University of Abuja and University of Ilorin. 20 Instructors were randomly sampled from each of the institutions selected, thus giving a total of 100 respondents. A structured questionnaire was used for data collection. The validity was ensured using face and content validity by a group of experts in open and online education. The reliability of the instrument was ascertained using a pilot study which included a different population but similar characteristics. The instrument 'Improving Online Learning and Instructor Development Questionnaire' (IOLIIDQ) was pilot tested with a group of academic staff from Covenant University, Ogun state with sample of 30. The instruments yielded a correlation coefficient (r) of 0.89, it was therefore deemed suitable for use in this study. Data collected were



analysed with inferential statistics. The hypotheses were analysed with Pearson's Product Moment Correlation, two-way analysis of variance and t-test analysis at 0.05 level of significance.

Result

Hypothesis 1: There is no significant relationship between Instructors' development on online learners' academic performance in Nigeria

Table 1- Correlation between the impact of Instructors' development and learners' academic performance in Nigeria.

Variables	No.	Mean	Stand Dev	r-cal	Sig.	Remark
Instructors' development	100	39.37	2.36	0.840*	0.00	Significant
Learners' academic performance	100	42.13	1.29			

*p<0.05

Table 1 revealed that the r-cal value is significant at 0.05 level of significance. The null hypothesis is therefore rejected. The implication of this is that there is a significant relationship between Instructors' development and learners' academic performance.

Hypothesis 2: There is no significant main effect of instructors' development on attrition of students in Nigeria.

Table 2- Analysis of variance of Instructors' development on attrition.

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model				87.740	
	507.075 ^a	11	46.098		.000
Intercept				58089.411	
	30519.776	1	30519.776		.000
Level of Instructors' Development				43.521	
	45.732	2	22.866		.000
Attrition				5.250	
	16.551	6	2.758		.000
Level of Instructors' development*				.417	
	.657	3	.219		.741
Attrition					



Error	46.235	88	.525
Total	155553.000	100	
Corrected total	553.310	99	

a.R Squared =.916 (Adjusted R Squared =.906)

From Table 2 above, the p-value of 0.000 is less than 0.05 level of significance ($p < 0.05$). This necessitates the rejection of the null hypothesis. Therefore there is a significant main effect of Instructors' development on attrition of students.

Hypothesis 3: There will not be any significant difference between Instructors that have OL background and those that do not have it.

Table 3- t-test Analysis of difference between Instructors that have OL background and those that do not have it.

Variation	X	SD	df	t-cal	P
Instructors with DL background	38.30	2.86	98	3.693*	0.00
Instructors without DL background	40.00	1.76			

* $p < 0.05$

Table 3 reveals that t-cal value of 3.693 is greater than t-tab value of 1.96 at 0.05 level of significance. This implies that the null hypothesis is rejected, there is a significant difference between the two groups. It shows that Instructors with online learning background get a better result than their counterparts without online learning background. Adedapo (2021) corroborated this result in the study on Teachers' attitudes towards teaching of basic science and technology and students' achievement at junior secondary school level in Ibadan metropolis where he wrote extensively on the imperative of quality in online learning.

Discussion of Findings

The study reveals that there is a significant relationship between Instructors' development and learners' academic performance. This is in line with Millard (2020)'s assertion that Instructors' feedback motivates learners. Competent and experienced performance of instructor helps learners to gain confidence and encouraged to continue and improve. The quality of learners' academic performance is what is most



germane as opined by Apena (2019) in the study on Ensuring Quality in Lifelong Learning through Learner Support Services. So, Instructors' development has great impact on learners' academic performance.

It also reveals that there is a significant main effect of Instructors' development on attrition of students. The result reveals that there is significant difference between the performance of Instructors with OL background and those without it. This is in line with the research of Nwogbo Kadiri & Okoronkwo (2026) in which institutional policy, targeted professional development and reliable support services were recommended among other things. The authors also recognised the leadership of National Open University of Nigeria in the nation's online learning mode. Thus, the rejection of the third hypothesis that says there will not be any significant difference between Instructors that have OL background and those that do not have it. This is in line with Sahu, Dalcik, Dalcik, Gupta, Chattu, and Umakanthan (2022) who asserted that understanding of learners is imperative for successful facilitation.

Conclusion

As online learning continues to grow in popularity across the global developing world context, there is need to ensure that the gains of the past couple of decades are not discounted. Tutorial teaching is an important rubric of the quality assurance process in online learning and the quality of teaching is at the centre of this process. Continuous training, monitoring and evaluation of Instructors are directly linked to the performance of online learners.

Recommendations

Based on the findings, the following recommendations were made:

1. All new instructors need to participate in an orientation seminar to understand the nature and dynamics of online education;
2. An instructors' performance evaluation scheme must be agreed with newly appointed instructors and contract renewal must be based on satisfactory rating;
3. Provision of tutorial facilitation is essential for all online learning courses either using face-to-face meetings or teaching; although students have the option of not attending.

References

- Adedapo, A. (2021). Teachers' Attitudes towards teaching of basic science and technology and students' achievement at junior secondary school level in ibadan metropolis. *Sokoto Educational Review*, 20(1&2), 253–261. <https://www.sokedureview.org/index.php/SER/article/view/449>
- Apena, T. T. & Osikomaiya, O. M. (2025). Assessing the Impact of Adult Basic Education Programme on Reading Skills Dutsin-Ma *Journal of English and Literature (DUJEL)* 10(2). 478-497 A



Publication of the Department of Languages and Linguistics, Federal University Dutsin-ma, Katsina State

Apena, T. & Olagunju, B. (2025). Evaluation of Working-Class Adults' Readiness for Lifelong Learning in the AI Era: Implications for Future-Proofed Development in Osun State, Nigeria NOUN Journal of Education Special Edition 2025 1-9 ISSN: 2504-8945 A Publication of the Faculty Of Education, National Open University Of Nigeria.

Apena, T. T. (2019a). Educating against discrimination of female adult citizens in Nigeria: The open online learning as a panacea Ife Psychologia: An International Journal. Vol.27, No. 2 A-Z Publications

Apena, T. (2019b). Ensuring Quality in Lifelong Learning through Learner Support Services. *Proceeding of the Pan-Commonwealth of Learning 9th Conference held between 9th and 12th September, 2019 in Edinburgh, Scotland*

Buczynski, S. & Hassan, C. B. (2021). Impact of professional development on teacher practice: Uncovering connections. *Improve and Teacher Education* 26 (3) 606 Darling-Harmmond, L., Hyler, M. E. & Gardner, M. (2017). Effective teacher professional development. <https://learningpolicyinstitute.org>

EvalCommunity Academy (2025). What is The Theory of Change <https://academy.evalcommunity.com/what-is-theory-of-change/>

Feldberg-Dubin, H. (2019). Top 11 skills of an effective Instructor <https://www.thedesigngym.com>

Fullan, M. (2019). *Nuance: Why some leaders succeed and others fail*. Thousand Oaks, CA. Corwin press

Furnborough, C. & Truman, M. (2019). Adult beginner online language learner perceptions and use of assignment feedback Researchgate DOI:10.1080/0158791090 323654 <https://www.researchgate.net/publication/4279961>

Gallien, T. & Oomen-Early, J. (2018). Personalised versus collective instructor feedback in the teaching courseroom: Does type of feedback affect student satisfaction, academic performance and perceived connectedness with instructor? *International Journal of Learning*, Vol. 7, No. 3 pg. 463-476 <https://eric.ed.gov/?id=EJ801008>

Gao, S. (2022). *Learner support for online learners. A study of six cases of ICT based Online Education Institute in China*. ISBN: 978-91-7447-575-3 Unversitetsservice US-AB Stockholm. Sweden



- Lee, J. (2023). Current status of learner support in online education: Emerging issues and directions for future research. *Asia Pacific Education Review*. Vol. 3, No. 2.181-188 <https://file.eric.ed.gov/fulltext/EJ776363.pdf>.
- Lentell, (2025). Towards an understanding of attributes and expertise. <https://www.researchgate.net>
- Millard, L. (2020). Improve the teachers: Ways of improving improve and identifying areas of development. <https://www.ard.bmj.com/content>
- Nwogbo, D. C., Kadiri, K., & Okoronkwo, P. (2026). Effect of E-Facilitation on Students' Performance and Satisfaction in the National Open University of Nigeria, Abuja. *African Journal of Stability and Development (AJSd)*, 18(1), 487–503. <https://doi.org/10.53982/ajsd.2026.1801.23-j>
- Olubodun, O. & Apena, T. (2023). Social Impact of Ageism on the Use of English Language among the Aged in the South Western Nigeria. *International Journal of Educational Issues (IJEI)* 9(1) 26-36, ISBN: 2550-7753 A publication of the Department of Arts Education, Faculty of Education, Adekunle Ajasin University, Akungba-Akoko, Ondo state
- Salawu, O., Ojo, D. O., Adedapo, A. A. & Apena, T. T. (2024). Effects of selected non-formal education strategies in curbing adolescents social vices in Nigeria Pp (1-132) (Technical Report on IBR Grant) National Open University of Nigeria, Abuja <https://www.open.edu>
- Tait, A. (2014). From place to virtual space: Reconfiguring student support for online and e-Learning in the digital age. *Open Praxis*, Vol. 6, Issue 1pg. 5-16 (ISSN 2304 -070X) <https://files.eric.ed.gov/fulltext/EJ1076777.PDF>
- Thorpe, M. S. (2022). Rethinking learner support: The challenge of collaborative teaching learning. *Open Learning* 17(2) Researchgate DOI: 1080/02680510220146887a
- Usun, S. (2024). Learner support services in online education system (A case study of Turkey). *Turkish Teaching Journal of Online Education TOJDE* Vol. 5, No. 4 ISSN 1302-6488 <https://files.eric.ed.gov/fulltext/ED494552.pdf>
- Sahu, P. K., Dalcik, H., Dalcik, C., Gupta, M. M., Chattu, V. K., Umakanthan, S. (2022). Best practices for effective implementation of online teaching and learning in medical and health professions education: during COVID-19 and beyond. *AIMS Public Health*. 27;9(2):278-292. doi: ealth.2022019. PMID: 35634030; PMCID: PMC9114788. w.opencolleges.edu.au



TEACHERS' DISPOSITIONS TOWARDS INTEGRATING ARTIFICIAL INTELLIGENCE IN SECONDARY SCHOOL CURRICULUM IN ADO-ODO OTA LOCAL GOVERNMENT AREA IN OGUN STATE, NIGERIA

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Abstract

Artificial Intelligence (AI) is the theory and development of computer systems capable of performing tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages. This approach has been adopted by many organizations, including schools, to facilitate the teaching and learning process. This development has raised varying opinions on the future of employment within all sectors, including the educational sector. The purpose of this research was to examine teachers' dispositions towards integrating artificial intelligence in secondary school curriculum using selected schools in Ado-Odo Ota Local Government in Ogun State. A descriptive statistical method was used, and 120 teachers were purposively sampled from public secondary schools in Ado-Odo Ota Local Government in Ogun State. The data were collected using a questionnaire and analyzed using descriptive statistical methods. The findings of the study revealed that Teachers' disposition towards integrating AI in secondary school is positive and slightly above the 50% average point, Teachers perceive the influence of integrating AI on the academic performance of secondary school students is positive and very high and lack of understanding of AI concepts, lack of access to digital devices, lack of training skills, and high cost of data subscription affected the integration of AI in the school. It was recommended among others that teachers should be sensitized to the importance of Artificial Intelligence in teaching.

Keywords: Artificial Intelligence, Secondary School Curriculum, Teachers Dispositions and Computer System

Introduction

The need for computer technology and literacy in our educational system has become more relevant (Badmus, 2004). Artificial Intelligence (AI) is a broad field encompassing various technologies that have been developed over the past 50 years to enable machines to perform tasks traditionally requiring human intelligence, such as perceiving, reasoning, learning, and interacting (Ergen, 2020). The recent advancements in generative AI (GenAI), have brought unprecedented attention to AI's transformative



potential across the education system. According to Hong *et al.*, 2022 predictive (pre-generative) AI focuses on predictions and decision-making through a variety of machine learning and modeling techniques, generative AI specializes in creating new content, such as text, images, and code, by using deep learning models, which is essential to understanding the breadth of AI applications in education.

Artificial intelligence in education (AIED) is an evolving interdisciplinary arena incorporating AI technologies to renovate and enhance teaching and learning environments. Particularly, the application of AI in science teaching and learning is becoming more popular, even as interest in AI's effects on general education is growing (Chiu *et al.*, 2023). More specifically, machine learning, a specific artificial intelligence technology, has been applied to automatically evaluate scientific models used in the education sector.

As Gonzalez *et al.* (2023) found, rapid technological development has unlocked potential, challenges, and prospects in teaching and learning. Technological development has also widened the gap in understanding how these technologies are used, applied, and how they work, especially emerging technologies such as Artificial Intelligence (AI) and Machine Learning (ML).

Gonzalez added that AI algorithms and systems are increasingly becoming integrated with our society, automating tasks and assisting humans with decisions. As such, AI would undoubtedly cause the workforce to evolve, which suggests new responsibilities for all, especially developing approaches to build future knowledge workers and set the stage for their careers, which will require the ability to interact with AI and ML tools effectively. Realizing the need to prepare secondary school students for an AI and ML-permeated future, researchers, practitioners, and educational stakeholders have made concerted efforts to develop resources for teaching ML. According to Olaleye (2022), who discovered a guideline that was developed for teaching AI to secondary school students through the joint effort of the Association for the Advancement of Artificial Intelligence (AAAI) and the Computer Science Teachers Association (CSTA). Subsequently, resources and activities that promote understanding of AI and ML keep unfolding. Such resources and activities include the development, implementation, and evaluation of curriculum and tools.

Innovative approaches that use technology to enhance education have contributed immensely to the development of education in this part of the developing world (Badmus, 2020). Artificial intelligence (AI) is an innovative technical framework that encompasses creating computer systems with the ability to execute activities that usually need human intellect. These activities involve problem-solving, acquiring knowledge, comprehending language, and seeing visual information. AI has become increasingly prominent in recent years, bringing about a revolutionary transformation in the methods by which jobs are completed in numerous businesses. Within the realm of education, artificial intelligence (AI) offers a multitude of possibilities to augment the learning process. Intelligent systems provide the ability to adjust to the specific requirements of each learner, deliver tailored learning experiences, and provide immediate feedback. AI applications in education encompass adaptive learning platforms, intelligent tutoring systems, and virtual simulations. Through the use of artificial intelligence, educators can construct dynamic and interactive learning environments that accommodate the various learning styles and capabilities of students



(Badmus & Shittu, 2025). The convergence of AI and scientific education presents significant opportunities for tackling the obstacles encountered by the Nigerian educational system. The use of AI tools and technology in secondary school science classrooms has the potential to fundamentally transform the methods of teaching and learning, hence enhancing accessibility, engagement, and effectiveness of education.

The crucial role of teachers in the teaching and learning process cannot be over-emphasized. This becomes more evident when new ideas and topics are to be introduced to students. Artificial intelligence (AI) education, a relatively new concept for the secondary school educational level, has been considered an important subject to be incorporated from secondary school through to high institution (Sanusi, & Dixon, 2022). According to Olaleye (2022), the emergence of AI education as a subject places new demands on teachers, researchers, and policymakers to ensure its effective implementation in schools. While the adoption of new curricula material necessitates state policy analysis and future needs, the study also claimed that there are increasing initiatives by researchers to ensure the democratization of AI among students across grade levels. Such initiatives include the design of curricula, tools, resources, and approaches that support teaching and learning AI concepts. Sanusi, (2022) discovered that despite several researcher-designed curricula and resources to introduce the AI concept, still teachers possess limited knowledge to teach AI to their students. Lack of AI knowledge as a barrier to AI implementation, has begun to explore the preparation of teachers to teach AI through professional development (PD) programs (Lee & Perret, 2022) and co-design of learning resources. Sanusi, (2022) posited that PD is important in exploring teachers' intention and readiness to teach AI in classrooms is imperative since teachers' acceptance and disposition could be a pointer to their interest in teaching technology and impact their teaching practices.

Olasedidun, Ganiyu and Badmus (2021) agreed that gathering teachers' attitude and readiness to teach with digital technology or online facilitation would contribute to understanding the factors that support the successful implementation of AI in schools. The study also claimed that there is a lack of research in the emerging field that specifically considers teachers, no study has investigated teachers' intention and readiness to teach AI in schools which necessitates the need to consider filling the gap. Kamrani, (2021) has identified students' intention to learn AI; teacher's perspective should not be secondary since teachers are expected to promote AI-related concepts in class. It is then necessary to understand their perspectives that will encourage effective implementation of the subject in schools. Teacher readiness is defined as the degree to which an individual feels confident about oneself in disseminating AI education in secondary schools.

According to Omidiora, (2022), since teacher education for AI is lacking, there is a need to prepare PD to ensure teachers can lead this discussion in classrooms, teachers of different disciplines could be trained as an alternative for specialized teachers to ensure AI is democratized for future designers and shapers of AI technologies. This assumption is corroborated by the study of Lin and Van Brummelen (2021), who co-designed lesson plans with teachers of various subjects such as history and language art, among other STEM subjects, to embed AI concepts into those subjects. The study posited that teachers'



perspectives from varying specializations to understand the factors that could influence the effective implementation of AI in Nigerian schools as confidence in teaching AI, the relevance of AI, and AI for social good among others, were adopted to propose a framework guided by the theory of planned behaviour (TPB).

Statement of the Problem

In recent years, the integration of artificial intelligence (AI) into educational settings has emerged as a promising avenue for enhancing learning outcomes and academic standards. With advancements in technology, AI-powered tools such as chatbots have gained traction in supporting students' academic endeavors by providing personalized assistance and facilitating access to information. However, according to John (2022) who says that the potential displacement of human educators by AI systems raises concerns about transparency and accountability in decision-making processes. Limited language options, academic dishonesty, biases, and lack of accountability, as well as laziness among students and teachers, are reported challenges in the adoption of AI in education. Uncertainty remains among teachers regarding how to effectively harness AI's pedagogical advantages and its impact on teaching and learning in secondary education. On this note, this study emerged to examine teachers' dispositions towards integrating artificial intelligence in secondary school curriculum using selected schools in Ado-Odo Ota Local Government in Ogun State

Purpose of the Study

The main purpose of this study was to examine the teachers' dispositions towards integrating artificial intelligence in secondary school curriculum using selected schools in Ado-Odo Ota Local Government in Ogun State. Specifically, the study sought to;

1. Examine the teachers' dispositions towards integrating artificial intelligence in secondary schools in Ado-Odo Ota Local Government in Ogun State.
2. Determine the perceptions of teachers towards the use of AI tools in secondary schools in Ado-Odo Ota Local Government in Ogun State
3. Determine the factors affecting the effective use of AI in secondary schools in Ado-Odo Ota Local Government in Ogun State

Research Questions

1. What are the teachers' dispositions towards integrating artificial intelligence in secondary schools in Ado-Odo Ota Local Government in Ogun State?
2. To what extent do teachers perceive the influence of integrating artificial intelligence on academic performance of secondary school students in Ado-Odo Ota Local Government in Ogun State?
3. What are the factors affecting the effective use of AI in secondary schools in Ado-Odo Ota Local Government in Ogun State?



Methodology

The study used a descriptive research design. This means this paper elaborates the past studies and researches undergone with these very same variables. The population for this study comprised all the teachers in Ado-Odo Ota Local Government in Ogun State. There are 27 (twenty-seven) public secondary schools in Ado-Ota Local Government Area of Ogun State.

The sample size for this study was 15 schools which were randomly selected from 27 public secondary schools in Ado-Odo Ota Local Government in Ogun State. Eight (8) teachers were purposively selected from each school. Only the teachers who had a background in computer education and ICT participated in this study. In all, 120 teachers participated in this study.

The data for this study was a questionnaire developed by the researcher to get the necessary data. The questionnaire was titled 'Teachers Dispositions towards Integrating Artificial Intelligence in Secondary School Curriculum' (TDIAISSC). The questionnaire was divided into two parts namely; personal demographic data and topic data. A four-point Likert scale in the orders of Strongly Disagreed (1), Disagreed (2), Agreed (3), and Strongly Agreed (4) to solicit meaningful information from the respondents in an organized way.

The instrument was validated by four experts from the Faculty of Education, using two experts from educational technology, one expert from curriculum instruction and one from educational evaluation. This was done for face and content validity and all the corrections and suggestions observed were effectively observed before the final copy was produced. The reliability was ascertained through the test-re-test method of estimating reliability. The two sets of scores obtained were correlated using the Pearson product-moment correlation coefficient and 0.71 was obtained.

During the research work, two main data sources are used for data collection. These are primary data sources and secondary data sources. The researcher collected original primary data from the field or sources personally to find answers to the research questions, through questionnaire administration and interviews. Secondary data is used as a complement to the primary data collected by the researcher. It is used with the view to complementing the information and explanations that the primary data source provided the researcher.

Data captured in the study was analyzed by using descriptive statistical methods. Descriptive analysis involves the use of percentages, tabulations, and graphs in analyzing data.

Results

The findings from the study were presented and analyzed chronologically based on research questions formulated.

Descriptive Analysis of the Research Questions



Research Question 1: What are the teachers' dispositions towards integrating artificial intelligence in secondary schools in Ado-Odo Ota Local Government in Ogun State?

Table 1: Teachers' Dispositions towards Integrating Artificial Intelligence in Secondary Schools in Ado-Odo Ota Local Government In Ogun State

S/N	Items	SA	%	A	%	D	%	SD	%	Remark
1	AI can improve the quality of teaching and learning in secondary schools	22	19.1	35	30.4	28	24.3	30	26.1	Negative
2	AI can reduce teachers' workload in lesson planning and assessments	31	27	42	36.5	37	32.2	5	4.3	Positive
3	The use of AI can personalize students' learning experiences	18	15.7	49	42.6	40	34.8	8	6.9	Positive
4	I feel confident in learning how to use AI tools for my teaching subject	22	19.1	48	41.7	32	27.8	13	11.3	Positive
5	I believe AI technology will positively impact my teaching effectiveness	25	21.7	39	33.9	37	32.2	14	12.2	Positive
Average (%)		20.52		37.02		30.26		12.16		Positive

Table 1 shows that average percentage of responses indicated that (20.52%) strongly agreed, (37.02%) agreed, which amounted to (57.54%) total agreement of the participants agreed on the teachers' dispositions towards integrating artificial intelligence in secondary school in Ado-Odo Ota Local Government in Ogun State. Meanwhile, (30.26%) disagreed, and (12.16%) strongly disagreed which also amounted to (42.42%) in disagreement with the integrating AI in secondary curriculum. The implication of this result is that teachers' disposition towards integrating artificial intelligence in secondary school is positive and slightly above the 50% average point.

Research Question 2: To what extent do teachers perceive the influence of integrating artificial intelligence on academic performance of secondary school students in Ado-Odo Ota Local Government in Ogun State?



Table 2: Perceived Influence of integrating Artificial Intelligence on academic performance of secondary school students in Ado-Odo Ota Local Government in Ogun State

S/ N	Items	S A	%	A	%	D	%	SD	%	Remarks
6	AI tools can enhance students' understanding of difficult subjects	27	23.5	41	35.7	26	22.6	21	18.3	High
7	The use of AI can improve students' academic performance through personalized learning	33	28.7	50	43.5	21	18.3	11	9.6	High
8	AI helps in providing instant feedback on students' assignments and assessment	20	17.4	59	51.3	22	19.1	14	12.2	High
9	AI integration will improve students' participation and engagement in learning activities	31	27.0	56	48.7	21	18.3	7	6.1	High
10	AI tools are more effective in helping students improve academically than traditional teaching methods	27	23.5	39	33.9	44	38.3	5	4.3	High
Average (%)		24.02		42.62		23.32		10.04		High

Table 2 shows that (24.02%) (strongly agree) and (42.62%) (agree) were percentages of agreement with the responses which amounted to 66.64% for participants who agreed on the teachers' perception of the influence of integrating artificial intelligence on academic performance of secondary school students in Ado-Odo Ota Local Government in Ogun State. However, (23.32%) disagreed and (10.04%) strongly disagreed which amounted to (33.36%) in disagreement. This result implied that teachers perceive the influence of integrating artificial intelligence on the academic performance of secondary school students is positive and very high.

Research Question 3: What are the factors affecting the effective use of AI in secondary schools in Ado-Odo Ota Local Government in Ogun State?

Table 3: Factors affecting the Effective use of AI in Secondary schools in Ado-Odo Ota Local Government in Ogun State

S/N	Items	SA	%	A	%	D	%	SD	%	Remarks
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11.	Difficulty in understanding artificial intelligence concepts	27	23.4	49	42.7	20	17.4	19	16.6	Affecting
12.	Lack of access to digital devices or the internet on school premises	25	21.8	39	33.9	30	26.1	21	18.3	Affecting
13.	Lack of training and technical skills	38	33.1	42	36.6	25	21.8	10	8.7	Affecting
14.	High cost of data subscription	30	26.1	43	37.4	23	20	19	16.5	Affecting

Table 3 shows that percentages of strongly agree and agree of the items are greater than that of disagree and strongly disagree. The results indicated lack of understanding of AI concepts, lack of access to digital devices, lack of training skills, and high cost of data subscription affected the integration of AI in the school.

Summary of the findings

The results revealed the following major findings, the study established that

1. Teachers' disposition towards integrating artificial intelligence in secondary school is positive and slightly above the 50% average point.
2. Teachers perceive the influence of integrating artificial intelligence on the academic performance of secondary school students is positive and very high.
3. lack of understanding of AI concepts, lack of access to digital devices, lack of training skills, and high cost of data subscription affected the integration of AI in the school.

Discussion of Findings

The findings in this study revealed that there is a significant relationship between integrating artificial intelligence in the secondary school curriculum and student's academic performance in Ado-Odo Ota Local Government in Ogun State; there is a significant difference between teachers' dispositions towards integrating artificial intelligence in secondary school curriculum and the academic performance of students in Ado-Odo Ota Local Government in Ogun State, there is a significant difference between challenges associated with using AI in secondary school and integration of artificial intelligence in secondary school curriculum in Ado-Odo Ota Local Government in Ogun State.

This finding agrees with that of Ahmet & Fatih (2020) contend that the function of teachers in the educational setting will no longer be the same. To properly deploy AI in this context and encourage a collaborative and participatory mindset, teachers must obtain sufficient training. A more globalized and



linked form of education is emerging as a result of studies on the possibilities of AI-driven social and cooperative learning. Furthermore, According to Salome et al. (2023), Several of the educational tasks that are probably to be automated by artificial intelligence are creating course material and performing administrative chores. It's fascinating to observe that attitudes toward AI systems tend to be influenced by the name "AI," which is related to these perceptions. Also (Avik, 2018) concluded from their study that to overcome these challenges and provide a suitable environment for the responsible and efficient use of AI-driven education, it is crucial to adopt a cooperative and inclusive strategy encompassing government entities, educators, technology suppliers, and policymakers. The study showed a significant positive relationship between artificial intelligence and the academic performance of secondary school students in Ado-Odo Ota Local Government in Ogun State. The result shows that there is a significant relationship between artificial intelligence and the school curriculum of secondary school students in Ado-Odo Ota Local Government in Ogun State. This finding also revealed that there is significant relationship between artificial intelligence and learning in Ado-Odo Ota Local Government in Ogun State.

Conclusion

This study focused on teachers' dispositions towards integrating artificial intelligence in secondary school curriculum using selected schools in Ado-Odo Ota Local Government in Ogun State. Having so far examined the relationship between artificial intelligence and the performance of secondary school students in Ado-Odo Ota Local Government in Ogun State. It is hereby concluded that the use of artificial intelligence (AI) in secondary school curricula has demonstrated a beneficial effect on student involvement and academic achievements.

Recommendations

Based on the findings of the study and the conclusion drawn from it, the following recommendations are made:

1. Teachers should be sensitized to the importance of Artificial Intelligence in teaching,
2. Teachers should be oriented on how integration of Artificial Intelligence would promote the performance of students in the state.
3. The school management and Governments should look into the factors hinder the effective use of AI and other technology tool in Ogun State,

References

- Ahmet, G. & Fatih, A. (2020) Artificial Intelligence in Education and Schools. Research on Education and Media Vol. 12 (1), 13 – 21. DOI: 10.2478/rem-2020-0003
- Badmus, A. M. & Shittu, K. A. (2025). Awareness and Perception of AI Learning Tools for Educational Delivery among Tertiary Institutions in Kwara State, Nigeria. *CUSTECH International Journal of Education*, 2(1), 160-168.



- Badmus, A. M. (2004). Computer instruction: An approach that expedites the system of education. *Nigeria Journal of Computer Literacy (NJCL)*, 5 (1), 21-31.
- Chiu, T. K., Xia, Q., Zhou, X., Chai, C. S., & Cheng, M. (2023). Systematic literature review on opportunities, challenges, and future research recommendations of artificial intelligence in education. *Computers and Education: Artificial Intelligence*, 4, 100118. <https://doi.org/10.1016/j.caeai.2022.100118>.
- Onuorah, B., Badmus, A. M. & Salawu, I. O. (2020). Effects of computer animation on academic performance of technical college students in visual arts concepts in Lagos State, Nigeria. *AAUA Journal of Science and Technology Education*, 3 (1), 91-101.
- Gonzalez, A. J., Hollister, J. R., DeMara, R. F., Leigh, J., Lanman, B., Lee, S. Y., & Wilder, B. (2017). AI in informal science education: Bringing turing back to life to perform the turing test. *International Journal of Artificial Intelligence in Education*, 27, 353–384. <https://doi.org/10.1007/s40593-017-0144-1>.
- Hesham, A., Juan, D., Vish, A. & Pedro F. (2023) Artificial Intelligence in Education (AIED): Implications and Challenges. Proceedings of the HCT International General Education Conference (HCT-IGEC 2023), Atlantis Highlights in Social Sciences, Education and Humanities 13, 126 - 140 https://doi.org/10.2991/978-94-6463-286-6_10
- Olasedidun, O. K., Ganiyu, R. S. & Badmus, A. M. (2021). Teachers' accessibility, competence and attitude toward adopting online teaching and learning during COVID-19 pandemic era in Oyo East Local Government secondary schools, Oyo State. *Port Harcourt Journal of Educational Studies (PHAJOES)*, 6 (1), 221-227.
- Salome, C., Laurent, B., Frank, A. & Philippe, D. (2023) Teachers' attitudes towards AI: what is the difference with non-AI technologies? Proceedings of the 45th Annual Conference of the Cognitive Science Society. 2069 – 2076