

ICT And E-Learning as Predictors of Academic Performance Among Secondary School Students In Uvwie Local Government Area, Delta State, Nigeria

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Abstract

This study examined the impact of information and communication technology (ICT) and e-learning on the academic performance of secondary school students in Uvwie Local Government Area of Delta State, Nigeria. The study was motivated by the growing use of digital technologies in education and the need to understand how effectively these resources are being integrated into secondary school teaching and learning. A descriptive survey design was adopted. The study involved teachers from five selected secondary schools, comprising three private and two public schools. A structured questionnaire was administered to 210 respondents, of which 200 properly completed questionnaires were retrieved and analysed, giving a response rate of 95.2%. Data were analysed using frequency counts, percentages and chi-square goodness-of-fit tests at the 0.05 level of significance. The findings showed that 71.0% of respondents acknowledged a relationship between ICT/e-learning and teaching and learning, while 92.0% agreed that ICT/e-learning equipment facilitated learning. Similarly, 76.0% reported that ICT made teaching and learning more interesting and understandable, and 91.0% believed that ICT knowledge enhanced teacher effectiveness. Although 71.0% perceived ICT/e-learning as improving learning outcomes, only 60.0% reported using ICT/e-learning materials during lesson preparation or teaching, while 35.0% did not. Furthermore, 95.0% agreed that ICT/e-learning could facilitate the transition from traditional to modern teaching approaches. All the observed response distributions differed significantly from equal distributions ($p < 0.001$). The study concludes that ICT and e-learning are widely perceived as valuable for strengthening teaching and learning, although actual utilisation remains below the level of positive perception. The study recommends improved ICT infrastructure, regular teacher training, reliable electricity and internet connectivity, and stronger monitoring of ICT utilisation in schools.

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I. INTRODUCTION

The swift evolution of information and communication technology (ICT) has reshaped teaching, learning, and access to educational resources. Tools such as computers, smartphones, the internet, digital learning platforms, educational apps, and multimedia materials have stretched learning opportunities beyond the physical classroom. These technologies enable students to retrieve instructional content, interact with digital resources, communicate with teachers and classmates, and pursue self-directed learning. As a result, ICT plays a growing role in modern education and in equipping students for a technology-driven society [1]. One major application of ICT in education is e-learning, which involves the use of electronic technologies and digital platforms to support teaching, learning, communication and access to educational resources. It includes online classes, learning management systems, recorded lessons, electronic textbooks, educational videos and online assessments. When effectively integrated into instruction, e-learning can make learning more flexible, interactive and accessible while providing students with opportunities to continue learning beyond the physical classroom [2,3].

Academic performance is a key measure of the effectiveness of teaching and learning. While achievement is shaped by factors such as instructional quality, student motivation, socioeconomic background, class size, and the learning environment, access to suitable educational resources also plays a significant role. Information and communication technologies (ICT) can augment traditional instruction by offering additional explanations, visual aids, practice exercises, and opportunities for self-directed learning. Studies from developing countries suggest that when ICT is thoughtfully integrated, it can enhance academic outcomes; however, its impact depends heavily on the quality of implementation and how it is used [4]. In Nigeria, the integration of ICT into education has attracted increasing attention because of the opportunities it provides for improving teaching and learning. Studies have reported positive relationships between students' use of computers and academic performance [5], while the shift to online learning during the COVID-19 pandemic further demonstrated the growing importance of digital technologies in secondary education [6]. However, the availability of technology

does not automatically produce better academic outcomes. Effective use requires digital skills, reliable internet connectivity, appropriate learning resources and adequate teacher support. Teachers also need sufficient digital competence to integrate ICT meaningfully into classroom instruction [7,8].

However, despite the potential benefits of ICT and e-learning, their adoption in Nigerian schools continues to face several challenges, including inadequate digital infrastructure, unreliable electricity and internet services, limited access to digital devices, insufficient teacher training, and difficulties in sustaining students' engagement. Barikzai et al [1] identified inadequate infrastructure and implementation-related challenges as significant barriers to e-learning adoption in emerging economies. Similarly, Keržič et al [9] observed that the effectiveness of e-learning depends not only on the availability of digital tools but also on teacher involvement, service quality, and institutional readiness. These challenges may be particularly pronounced in public secondary schools, where limited resources can constrain the effective integration of technology into teaching and learning.

The situation is also relevant to secondary education in Delta State, where studies have reported both opportunities and challenges associated with the integration of educational technology. Emovavwerhe and Peretomode [10] found that secondary school teachers in Delta State generally demonstrated positive attitudes towards technology integration despite limitations in the availability of ICT facilities. Similarly, Onwuka [11] and Oyovwe-Tinuoye and Adomi [7] examined ICT use in instruction and teachers' experiences with e-learning in the state. These findings demonstrate the growing relevance of technology-supported education in Delta State; however, they also highlight the need for context-specific evidence on the extent to which ICT and e-learning actually contribute to students' academic performance, particularly at the secondary school level.

In Uvwie Local Government Area, secondary school students have varying levels of access to computers, smartphones, internet connectivity, and other digital learning resources. Although previous studies have investigated factors such as class size and students' academic performance in the area [12], limited research has focused specifically on the role of ICT and e-learning in improving students' academic performance. It is, therefore, important to examine the extent to which students utilise these technologies, the academic benefits derived from their use, and the challenges that may hinder their effective application in teaching and learning. Against this background, this study investigates the impact of ICT and e-learning on the academic performance of secondary school students in Uvwie Local Government Area of Delta State, Nigeria. The study is expected to provide useful evidence for teachers, school administrators, policymakers and other stakeholders on how ICT and e-learning can be effectively utilised to improve students' learning experiences and academic outcomes.

II. RESEARCH METHODOLOGY

Research Design

The study adopted a descriptive survey research design. This design was considered appropriate because the study sought to obtain information directly from secondary school teachers regarding the use of information and communication technology (ICT) and e-learning and their perceived contribution to students' academic performance. The descriptive survey approach enabled the researcher to collect data from a relatively large number of respondents and describe their experiences, perceptions and responses without manipulating the variables under investigation. The design also provided a suitable basis for examining whether significant associations existed between selected ICT/e-learning-related factors and academic performance using the Chi-square test.

Study Area

The study was conducted in Uvwie Local Government Area of Delta State, Nigeria. Uvwie is an urbanising local government area with several public and private secondary schools serving students from diverse social and economic backgrounds. The area was considered suitable for the study because schools within the locality increasingly operate in an educational environment where computers, smartphones, internet services, and other digital resources are becoming important tools for teaching and learning. The study covered five selected secondary schools, comprising three private schools and two public schools. The selected schools were Edulyn Schools, Alvina's Model and High School, Deeper Life High School, Opete, Army Day Secondary School, and Ogbe Secondary School. The inclusion of both private and public schools was intended to provide a broader basis for examining ICT and e-learning practices across different school settings and resource conditions. This approach also enabled the study to obtain responses from teachers operating under varying levels of access to digital facilities and technological resources.

Population of the Study

The population of the study comprised male and female secondary school teachers in the selected public and private secondary schools in Uvwie Local Government Area of Delta State. Teachers were selected as the respondents because of their direct involvement in classroom instruction and their experience with the use of ICT

and e-learning resources in teaching and learning. Their responses were considered useful for assessing the extent to which technology was utilised in the schools and its perceived influence on students' academic performance.

Sample Size and Sampling Technique

A sample of 200 secondary school teachers was selected for the study from the five selected secondary schools, comprising three private and two public schools. The respondents were selected using a simple random sampling technique. This technique ensured that every eligible teacher had an equal opportunity of being selected and reduced the likelihood of researcher bias in the selection process. The inclusion of teachers from both private and public secondary schools provided a broader representation of teachers' experiences and perspectives regarding ICT availability, e-learning utilisation, and technology-supported teaching in the study area. The sample was therefore considered appropriate for obtaining relevant data on the role of ICT and e-learning in enhancing the academic performance of secondary school students in Uvwie Local Government Area of Delta State.

Research Instrument

The instrument used for data collection was a structured questionnaire developed by the researcher based on the objectives and research questions of the study and informed by relevant literature on ICT, e-learning and students' academic performance. The questionnaire was designed in simple and clear language to make it easy for the respondents to understand and answer the questions based on their experiences in their respective schools. The questionnaire consisted of two main sections.

- Section A obtained information on the respondents' personal and professional characteristics. The information included school name, sex, years of teaching experience and educational qualification. These characteristics were included because teachers' background and professional experience may influence their exposure to and use of ICT and e-learning resources.
- Section B contained statements relating to ICT and e-learning and their perceived influence on students' academic performance. Responses were measured using a three-point response scale: Yes/Agree, No/Disagree and Undecided. The items addressed issues such as the availability and utilisation of ICT resources, the use of e-learning in teaching, students' access to digital learning materials, perceived effects of technology on learning and factors that may hinder effective ICT and e-learning utilisation.

Validity of the Instrument

The validity of the questionnaire was established through face and content validation. The instrument was reviewed by two experts in Measurement and Evaluation who assessed the items based on their relevance to the study objectives, clarity, appropriateness of wording, adequacy of coverage, and suitability for the target respondents. Their observations and recommendations were carefully considered, and necessary modifications were made to improve the clarity, relevance, and overall quality of the final instrument. Particular attention was also given to contextual validity to ensure that the items appropriately reflected the realities of ICT and e-learning within the secondary school environment in the study area. The need to ensure that research instruments are appropriate to their specific educational context is emphasised in educational research methodology [13].

Reliability of the Instrument

The reliability of the questionnaire was established to determine the consistency of the instrument in measuring the issues for which it was developed. The items in Section B were examined to ensure that they were clear, relevant and capable of producing consistent responses from the respondents. The reliability assessment was conducted before the final administration of the questionnaire, and items considered ambiguous or unsuitable were reviewed and modified accordingly. This process helped to improve the dependability of the instrument and ensured that the questionnaire was sufficiently consistent for collecting data on teachers' experiences and perceptions regarding ICT and e-learning in secondary schools.

Method of Data Collection

The researcher obtained the necessary permission to administer the questionnaire in the selected secondary schools. The questionnaires were administered directly to the selected teachers in their respective schools. The purpose of the study was explained to the respondents, and they were informed that their participation was voluntary and that the information provided would be used strictly for the purpose of the research. The researcher ensured that respondents were given adequate opportunity to complete the questionnaire. Completed questionnaires were collected and examined for completeness before being prepared for analysis. This approach helped to minimise missing responses and ensured that the information obtained reflected the views of teachers who participated in the study.

Method of Data Analysis

The completed questionnaires were coded and analysed using appropriate statistical procedures. Descriptive statistics, particularly frequency counts and simple percentages, were used to summarise the respondents' demographic characteristics and their responses to the questionnaire items. The results were presented in tables to make the findings clear and easy to interpret. The Chi-square (χ^2) test of independence was used as the inferential statistical technique for testing the hypotheses formulated for the study. The test was appropriate for determining whether statistically significant associations existed between selected categorical variables relating to ICT/e-learning utilisation and academic performance. The hypotheses were tested at the 0.05 level of significance. Where the calculated probability value was less than 0.05, the null hypothesis was rejected; where the probability value was greater than 0.05, the null hypothesis was not rejected. The combination of descriptive statistics and Chi-square analysis enabled the study to present both a general description of the respondents' views and statistical evidence regarding the relationships examined in the study.

III. RESULTS

These are the results obtained from the questionnaire administered to secondary school teachers in selected public and private secondary schools in Uvwie Local Government Area of Delta State. The study examined the role of information and communication technology (ICT) and e-learning in teaching and learning, with particular attention to their perceived contribution to students' academic performance. A total of 210 questionnaires were distributed to the selected respondents. After retrieval and screening, 200 questionnaires were found to be properly completed and were therefore used for the analysis, representing a response rate of 95.2%. The results were presented using frequency counts and percentages. Chi-square goodness-of-fit tests were subsequently used to determine whether the observed response patterns differed significantly from an equal distribution across the response categories. All inferential tests were conducted at the 0.05 level of significance. The responses to the questionnaire items are presented in Tables 1 to 12. Frequency counts and percentages were used to describe the distribution of respondents' answers.

Table 1: Respondents' Views on the Relationship Between ICT/E-Learning and Teaching and Learning

Response	Frequency (n)	Percentage (%)
Yes	142	71.0
No	38	19.0
Undecided	20	10.0
Total	200	100.0

Table 1 shows that 142 respondents (71.0%) agreed that there was a relationship between ICT/e-learning and teaching and learning. Thirty-eight respondents (19.0%) disagreed, while 20 respondents (10.0%) were undecided. The result indicates that most of the teachers perceived ICT and e-learning as relevant to the teaching and learning process.

Table 2: Respondents' Views on Whether ICT/E-Learning Equipment Facilitates Learning

Response	Frequency (n)	Percentage (%)
Yes	184	92.0
No	14	7.0
Undecided	2	1.0
Total	200	100.0

As shown in Table 2, 184 respondents (92.0%) agreed that ICT/e-learning equipment, including films, slides, transparencies, projectors and charts, facilitated learning. Fourteen respondents (7.0%) disagreed, while only two respondents (1.0%) were undecided. The finding shows a strong positive perception among the teachers regarding the usefulness of ICT-supported instructional materials.

Table 3: Respondents' Views on Whether ICT/E-Learning Helps to Reduce Abstraction in Teaching and Learning

Response	Frequency (n)	Percentage (%)
Yes	120	60.0
No	66	33.0
Undecided	14	7.0
Total	200	100.0

Table 3 indicates that 120 respondents (60.0%) agreed that ICT/e-learning helped to reduce abstraction in the teaching and learning process. Sixty-six respondents (33.0%) disagreed, while 14 respondents (7.0%)

were undecided. Although the majority expressed a favourable view, the relatively high proportion of respondents who disagreed suggests that this perception was not shared as strongly as some of the other ICT-related benefits examined in the study.

Table 4: Respondents' Views on Whether ICT Makes Teaching and Learning More Interesting and Understandable

Response	Frequency (n)	Percentage (%)
Yes	152	76.0
No	30	15.0
Undecided	18	9.0
Total	200	100.0

The result in Table 4 shows that 152 respondents (76.0%) agreed that ICT made teaching and learning more interesting and understandable. Thirty respondents (15.0%) disagreed, while 18 respondents (9.0%) were undecided. This finding suggests that teachers generally perceived technology-supported instruction as capable of improving students' engagement and understanding during lessons.

Table 5: Respondents' Use of ICT/E-Learning Materials During Lesson Preparation and Teaching

Response	Frequency (n)	Percentage (%)
Yes	120	60.0
No	70	35.0
Undecided	10	5.0
Total	200	100.0

Table 5 shows that 120 respondents (60.0%) reported using ICT/e-learning materials during lesson preparation or teaching. However, 70 respondents (35.0%) indicated that they did not use such materials, while 10 respondents (5.0%) were undecided. The finding indicates that although ICT/e-learning materials were used by the majority of teachers, a considerable proportion had not incorporated them regularly into their teaching activities.

Table 6: Respondents' Views on Whether ICT Knowledge Enhances Teacher Effectiveness

Response	Frequency (n)	Percentage (%)
Yes	182	91.0
No	12	6.0
Undecided	6	3.0
Total	200	100.0

Table 6 reveals that 182 respondents (91.0%) agreed that knowledge of ICT/e-learning enhanced their effectiveness as teachers. Twelve respondents (6.0%) disagreed, while six respondents (3.0%) were undecided. This was one of the strongest positive responses recorded in the study and suggests that teachers generally recognised ICT competence as an important component of effective teaching.

Table 7: Respondents' Views on Whether ICT Helps in Locating Resources for Lesson Preparation

Response	Frequency (n)	Percentage (%)
Yes	142	71.0
No	40	20.0
Undecided	18	9.0
Total	200	100.0

The result in Table 7 shows that 142 respondents (71.0%) agreed that ICT materials helped them locate resources and information for preparing lesson plans and notes. Forty respondents (20.0%) disagreed, while 18 respondents (9.0%) were undecided. The finding indicates that most teachers regarded ICT as a useful means of accessing instructional information and materials.

Table 8: Respondents' Views on Whether ICT/E-Learning Improves Mastery of the Subject Area

Response	Frequency (n)	Percentage (%)
Yes	142	71.0
No	40	20.0
Undecided	18	9.0
Total	200	100.0

Table 8 shows that 142 respondents (71.0%) agreed that the use of ICT/e-learning improved their mastery of the subject area in which they specialised. Forty respondents (20.0%) disagreed, while 18 respondents (9.0%) were undecided. The finding suggests that most teachers perceived digital resources as useful in strengthening their subject knowledge.

Table 4.9: Respondents' Views on Whether ICT/E-Learning Optimises the Value of Learning Outcomes

Response	Frequency (n)	Percentage (%)
Yes	142	71.0
No	40	20.0
Undecided	18	9.0
Total	200	100.0

Table 9 indicates that 142 respondents (71.0%) agreed that ICT/e-learning could optimise the value of learning outcomes. Forty respondents (20.0%) disagreed, while 18 respondents (9.0%) were undecided. The result reflects a generally favourable perception among teachers regarding the potential contribution of technology to students' learning outcomes.

Table 10: Respondents' Views on Whether Exposure to ICT/E-Learning Promotes Professional Development

Response	Frequency (n)	Percentage (%)
Yes	158	79.0
No	36	18.0
Undecided	6	3.0
Total	200	100.0

The result in Table 10 shows that 158 respondents (79.0%) agreed that exposure to ICT/e-learning promoted and facilitated professional development. Thirty-six respondents (18.0%) disagreed, while six respondents (3.0%) were undecided. This suggests that teachers recognised ICT and e-learning as useful not only for classroom instruction but also for their own professional growth.

Table 11: Respondents' Views on Whether ICT/E-Learning Facilitates the Transition from Traditional to Modern Teaching

Response	Frequency (n)	Percentage (%)
Yes	190	95.0
No	10	5.0
Undecided	0	0.0
Total	200	100.0

Table 11 reveals that 190 respondents (95.0%) agreed that ICT/e-learning could facilitate the transition from traditional teaching methods to modern approaches. Ten respondents (5.0%) disagreed, while none of the respondents was undecided. This was the highest level of agreement recorded across the questionnaire items and indicates strong support among teachers for the role of ICT in modernising teaching practices.

Table 12: Respondents' Views on Whether Under-utilisation of ICT Facilities Contributes to Limited Knowledge of Their Relevance

Response	Frequency (n)	Percentage (%)
Yes	164	82.0
No/Undecided	36	18.0
Total	200	100.0

Table 12 shows that 164 respondents (82.0%) agreed that under-utilisation of ICT facilities contributed to teachers' limited knowledge of their relevance, while 36 respondents (18.0%) either disagreed or were undecided. The result suggests that regular exposure and practical use of ICT facilities may be important for developing teachers' understanding and confidence in using technology for educational purposes.

Chi-square goodness-of-fit tests were conducted to determine whether the observed responses to each questionnaire item differed significantly from an equal distribution across the response categories. For items with three response categories, namely Yes, No and Undecided, the expected frequency was 66.67 per category based on 200 valid responses. The null hypothesis for each test assumed that the responses were equally distributed across the categories. The level of significance was set at 0.05.

Table 13: Chi-Square Goodness-of-Fit Test for the Relationship Between ICT/E-Learning and Teaching and Learning

Response	Observed (O)	Expected (E)	χ^2
Yes	142	66.67	85.12
No	38	66.67	12.33
Undecided	20	66.67	23.31
Total	200	200.00	120.76

$\chi^2 = 120.76$, $p = 0.000$

The result from Table 13 showed a statistically significant difference between the observed and expected response distributions, $\chi^2 = 120.76$, $p = 0.000$. The null hypothesis of equal response distribution was rejected. The significant result was largely attributable to the high proportion of affirmative responses, with 71.0% of respondents agreeing that ICT/e-learning was related to teaching and learning.

Table 14: Chi-Square Goodness-of-Fit Test for ICT/E-Learning Equipment as Facilitators of Learning

Response	Observed (O)	Expected (E)	χ^2
Yes	184	66.67	206.50
No	14	66.67	41.61
Undecided	2	66.67	61.77
Total	200	200.00	309.88

$\chi^2 = 309.88$, $p = 0.000$

The analysis shown in Table 14 revealed a statistically significant difference in the response distribution, $\chi^2 = 309.88$, $p = 0.000$. The null hypothesis was rejected. The finding was consistent with the strong affirmative response, as 92.0% of respondents agreed that ICT/e-learning equipment facilitated learning.

Table 15: Chi-Square Goodness-of-Fit Test for ICT/E-Learning and Reduction of Abstraction in Teaching and Learning

Response	Observed (O)	Expected (E)	χ^2
Yes	120	66.67	42.66
No	66	66.67	0.01
Undecided	14	66.67	41.61
Total	200	200.00	84.28

$\chi^2 = 84.28$, $p < 0.001$

As shown in Table 15, the result was statistically significant, $\chi^2(2, N = 200) = 84.28$, $p < 0.001$. The null hypothesis was rejected. Sixty per cent of respondents agreed that ICT/e-learning helped to reduce abstraction in the teaching and learning process. However, the finding also showed that 33.0% disagreed, indicating that this perception was not as strongly shared as some of the other benefits examined.

Table 16: Chi-Square Goodness-of-Fit Test for ICT/E-Learning and Making Teaching and Learning More Interesting and Understandable

Response	Observed (O)	Expected (E)	χ^2
Yes	152	66.67	109.21
No	30	66.67	20.17
Undecided	18	66.67	23.66
Total	200	200.00	153.04

$\chi^2 = 153.04$, $p = 0.000$

The response distribution shown in Table 16 differed significantly from an equal distribution, $\chi^2 = 153.04$, $p = 0.000$. The null hypothesis was rejected. A majority of respondents (76.0%) agreed that ICT made teaching and learning more interesting and understandable.

Table 17: Chi-Square Goodness-of-Fit Test for Teachers' Use of ICT/E-Learning Materials

Response	Observed (O)	Expected (E)	χ^2
Yes	120	66.67	42.66
No	70	66.67	0.17
Undecided	10	66.67	48.08
Total	200	200.00	90.91

$\chi^2 = 90.91$, $p = 0.000$

The result shown in Table 17 was statistically significant, $\chi^2 = 90.91$, $p = 0.000$. The null hypothesis was rejected. Sixty per cent of respondents reported using ICT/e-learning materials during lesson preparation or teaching. The finding also showed that 35.0% did not use such materials, indicating that actual utilisation was less widespread than the generally positive perceptions of ICT.

Table 18: Chi-Square Goodness-of-Fit Test for ICT Knowledge and Teacher Effectiveness

Response	Observed (O)	Expected (E)	χ^2
Yes	182	66.67	199.52
No	12	66.67	44.83
Undecided	6	66.67	55.36
Total	200	200.00	299.71

$\chi^2 = 299.71$, $p = 0.000$

The analysis in Table 18 revealed a statistically significant difference between the observed and expected frequencies, $\chi^2 = 299.71$, $p = 0.000$. The null hypothesis was rejected. A substantial majority (91.0%) of respondents agreed that knowledge of ICT/e-learning enhanced their effectiveness as teachers.

Table 19: Chi-Square Goodness-of-Fit Test for ICT Use in Locating Instructional Resources

Response	Observed (O)	Expected (E)	χ^2 contribution
Yes	142	66.67	85.12
No	40	66.67	10.67
Undecided	18	66.67	23.66
Total	200	200.00	119.45

$\chi^2 = 119.45$, $p = 0.000$

The result from Table 19 indicated a statistically significant response distribution, $\chi^2 = 119.45$, $p = 0.000$. The null hypothesis was rejected. Seventy-one per cent of respondents agreed that ICT helped them locate resources and information for lesson preparation.

Table 20: Chi-Square Goodness-of-Fit Test for ICT/E-Learning and Subject-Matter Mastery

Response	Observed (O)	Expected (E)	χ^2 contribution
Yes	142	66.67	85.12
No	40	66.67	10.67
Undecided	18	66.67	23.66
Total	200	200.00	119.45

$\chi^2 = 119.45$, $p = 0.000$

Table 20 revealed that the test produced a statistically significant result, $\chi^2(2, N = 200) = 119.45$, $p = 0.000$. The null hypothesis was rejected. Seventy-one per cent of respondents agreed that ICT/e-learning improved their mastery of their specialised subject areas.

Table 21: Chi-Square Goodness-of-Fit Test for ICT/E-Learning and Learning Outcomes

Response	Observed (O)	Expected (E)	χ^2 contribution
Yes	142	66.67	85.12
No	40	66.67	10.67
Undecided	18	66.67	23.66
Total	200	200.00	119.45

$\chi^2 = 119.45$, $p = 0.000$

The result in Table 21 showed a statistically significant difference between the observed and expected response distributions, $\chi^2 = 119.45$, $p = 0.000$. The null hypothesis was rejected. Seventy-one per cent of respondents agreed that ICT/e-learning could optimise the value of learning outcomes.

Table 22: Chi-Square Goodness-of-Fit Test for ICT/E-Learning Exposure and Professional Development

Response	Observed (O)	Expected (E)	χ^2 contribution
Yes	158	66.67	125.12
No	36	66.67	14.11
Undecided	6	66.67	55.36
Total	200	200.00	194.59

$\chi^2 = 194.59$, $p = 0.000$

The result from Table 22 showed a statistically significant difference in the distribution of responses, $\chi^2 = 194.59$, $p = 0.000$. The null hypothesis was rejected. Seventy-nine per cent of respondents agreed that exposure to ICT/e-learning promoted and facilitated professional development.

Table 23: Chi-Square Goodness-of-Fit Test for ICT/E-Learning and the Transition from Traditional to Modern Teaching

Response	Observed (O)	Expected (E)	χ^2 contribution
Yes	190	66.67	228.22
No	10	66.67	48.18
Undecided	0	66.67	66.67
Total	200	200.00	343.07

$\chi^2 = 343.07$, $p = 0.000$

The result from Table 23 revealed a highly significant difference between the observed and expected distributions, $\chi^2 = 343.07$, $p = 0.000$. The null hypothesis was rejected. An overwhelming majority of respondents (95.0%) agreed that ICT/e-learning could facilitate the transition from traditional teaching methods to modern approaches. This represented the strongest affirmative response recorded in the study.

Table 24: Chi-Square Goodness-of-Fit Test for Under-utilisation of ICT Facilities

Response	Observed (O)	Expected (E)	χ^2 contribution
Yes	164	100.00	40.96
No/Undecided	36	100.00	40.96
Total	200	200.00	81.92

$\chi^2 = 81.92$, $p = 0.000$

The analysis revealed a statistically significant difference between the observed and expected distributions, $\chi^2 = 81.92$, $p = 0.000$. The null hypothesis was rejected. The majority of respondents (82.0%) agreed that under-utilisation of ICT facilities contributed to teachers' limited knowledge of their relevance.

IV. DISCUSSION

Comparing the findings of the present study with evidence from earlier studies provides a broader understanding of ICT and e-learning practices in secondary schools in Uvwie Local Government Area of Delta State. The findings suggest that the teachers surveyed are not presenting an isolated or unusually optimistic view of ICT integration. Rather, their responses are consistent with a broader body of regional and international evidence, indicating that teachers' experiences of ICT use reflect established patterns in technology-supported teaching and learning. Take the finding that 71.0% of respondents agreed a relationship exists between ICT/e-learning and teaching and learning, $\chi^2 = 120.76$, $p = 0.000$. This is broadly consistent with Malkawi and Mohailan [2], who found that e-learning and its various components had a statistically significant effect on students' performance at Jordanian universities, even though both e-learning provision and student performance were reported at only moderate levels overall. The Jordanian findings suggest that a significant relationship between ICT/e-learning and academic outcomes can hold even where implementation is far from optimal, which mirrors the Uvwie pattern: teachers overwhelmingly endorsed the relationship in principle, even though, as will be discussed shortly, their actual usage rates lagged behind their beliefs. Similarly, Mensah et al [4], studying secondary school students in a developing-country context in Ghana, found that the availability of ICT resources at school and at home was critical to effective ICT use, and that students continued to face real challenges arising from limited internet access and, at times, unsupportive teacher attitudes. This is worth flagging because it reinforces the idea that access and institutional support, not just attitude, are the variables doing the heavy lifting in translating favourable perceptions into consistent classroom use.

The 92.0% agreement that ICT/e-learning equipment facilitated learning, $\chi^2 = 309.88$, $p = 0.001$, is among the highest levels of consensus recorded in this study, and it compares favourably with Awodiji et al's [14] finding that, in the post-COVID-19 era, teachers and school administrators in private secondary schools in Lagos State demonstrated high levels of access to, and confidence in, both synchronous and asynchronous instructional technology tools. What stands out when placing the Uvwie figure alongside Awodiji et al's work is that both studies point to a similar conclusion: once ICT equipment is genuinely available, educators tend to regard it very positively, which suggests that scepticism about ICT in Nigerian secondary education may have less to do with the intrinsic value teachers place on the tools and more to do with how consistently those tools are actually supplied. A related point emerges from Chen et al [15], who found that the relationship between e-learning engagement and academic performance was not uniform across all groups of learners, with students at different academic levels showing different patterns of motivation, learning approach and, in some cases, burnout in e-

learning environments. This is a nuance the present study did not examine but which future Uvwie-focused research on students themselves, rather than teachers alone, might usefully explore.

Where the Uvwie results become more cautious, and therefore more comparable to less optimistic findings elsewhere, is in the item on abstraction reduction, where only 60.0% agreed that ICT helped reduce abstraction in teaching and learning while 33.0% disagreed, $\chi^2 = 84.28$, $p = 0.000$. This more tempered consensus lines up with the broader argument advanced by Barikzai et al [1] in their scoping review of e-learning adoption in emerging economies, who found that success in e-learning implementation depends heavily on sustained institutional support and genuine pedagogical integration rather than the simple presence of technology, and that initiatives which overlook these deeper implementation factors tend to fall short of their intended learning gains. The parallel here is fairly direct: both the Uvwie data and the broader scoping-review evidence suggest that ICT's capacity to genuinely simplify difficult content does not follow automatically from access alone. This same hesitancy shows up again in the usage data, where 60.0% of Uvwie teachers reported actually using ICT/e-learning materials in lesson preparation or teaching, while 35.0% did not, $\chi^2 = 90.91$, $p = 0.000$. Yusuf et al [8], studying ICT utilisation among 723 senior secondary school students across six schools in Katsina State, reported a closely comparable pattern, finding that although students were making use of available ICT facilities, their utilisation was accompanied by real challenges that limited how fully those facilities could be exploited, leading the researchers to call for improved training and more efficient facility management. The consistency between the Katsina student-level findings and the Uvwie teacher-level findings is notable: whether one asks students or teachers, the story across these Nigerian contexts seems to be the same, a reasonably strong belief in ICT's value undercut by a meaningfully sized minority who are simply not using it in practice, most plausibly because the facilities or training are not reliably available to them.

On the more affirming side, the 91.0% agreement that ICT knowledge enhanced teacher effectiveness, $\chi^2 = 299.71$, $p = 0.000$, and the 79.0% agreement that exposure to ICT promoted professional development, $\chi^2 = 194.59$, $p = 0.000$, both sit comfortably alongside Awodiji et al's [14] observation that instructional technology tools were valued by Nigerian secondary school educators not only for classroom purposes but as an ongoing feature of their professional practice. The 95.0% agreement that ICT facilitates the transition from traditional to modern teaching, $\chi^2 = 343.07$, $p = 0.000$, the single strongest result in this study, also finds good company in Emovavwerhe and Peretomode's [10] Delta State findings, where secondary school teachers in the period following the COVID-19 pandemic expressed a positive attitude toward technology integration even in the continued presence of limited ICT facilities, and in Oyovwe-Tinuoye and Adomi's [7] account of secondary school teachers' e-learning experiences in the same state, which similarly described a willingness among teachers to embrace digital modes of instruction despite practical constraints such as slow connectivity and high data costs. What makes the Uvwie figure noteworthy in comparison is simply its scale, with zero respondents selecting "undecided," a level of unanimity rarely seen in the comparative literature, suggesting that whatever ambivalence exists among Uvwie teachers about ICT's practical limitations, there is essentially no ambivalence about the direction education ought to be moving in.

Finally, the finding that 82.0% of respondents attributed teachers' limited appreciation of ICT's relevance to under-utilisation of available facilities, $\chi^2 = 81.92$, $p = 0.000$, closely mirrors concerns raised in the broader literature on infrastructural and institutional constraints in Nigerian and West African secondary education. Oyovwe-Tinuoye and Adomi [7] documented similar frustrations among Delta State secondary school teachers, who reported that slow internet connectivity and high data costs frequently hindered effective e-learning implementation during and after the COVID-19 lockdown, even where teachers expressed genuine willingness to adopt digital methods. This resonates strongly with Barikzai et al's [1] scoping review of e-learning adoption across emerging economies, which concluded that infrastructural and institutional gaps, rather than educator willingness, tend to be the dominant barrier to effective adoption in resource-constrained settings. When this figure is set against Keržič et al's [9] cross-national finding that the overall readiness of the educational system was a stronger determinant of e-learning quality than individual digital competence alone, the Uvwie data read less like an isolated local complaint and more like a localised instance of a well-documented structural problem. Taken as a whole, then, the comparative picture suggests that Uvwie teachers are, if anything, slightly more enthusiastic in their perceptions than many of their counterparts elsewhere in Nigeria and West Africa, yet they remain constrained by the same access and training deficits that studies from Ghana to Katsina to Jordan have identified as the real bottleneck standing between favourable attitudes and consistent, pedagogically effective ICT use.

V. CONCLUSION

This study examined the perceived impact of information and communication technology (ICT) and e-learning on teaching and learning among secondary school teachers in selected public and private secondary schools in Uvwie Local Government Area of Delta State. Based on the findings, it can be concluded that ICT and e-learning were generally perceived by teachers as valuable tools for improving the teaching and learning process.

A large majority of the respondents recognised their contribution to making lessons more interesting and understandable, facilitating access to instructional materials, improving teachers' subject-matter knowledge and effectiveness, supporting professional development, and facilitating the transition from traditional teaching methods to more contemporary approaches.

The findings also indicated that teachers strongly recognised the potential of ICT and e-learning to improve students' learning outcomes. However, the study revealed an important gap between teachers' positive perceptions of ICT and their actual utilisation of ICT/e-learning materials. While most respondents acknowledged the benefits of technology, only 60.0% reported using ICT materials during lesson preparation or teaching, while a considerable proportion reported non-use. This suggests that positive attitudes alone may not be sufficient to ensure effective ICT integration. Challenges relating to availability, accessibility, teacher competence, infrastructure and opportunities for regular use may influence the extent to which technology is incorporated into classroom practice.

The study therefore concludes that ICT and e-learning have considerable potential to enhance the quality of secondary education in Uvwie Local Government Area, but their impact depends largely on how effectively they are integrated into everyday teaching. The findings support the need to move beyond simply providing technological facilities towards creating an educational environment in which teachers are adequately trained, facilities are functional and accessible, and ICT is deliberately incorporated into instructional activities. In this regard, ICT should be viewed not as a replacement for teachers or conventional teaching methods, but as a complementary resource capable of strengthening teachers' instructional effectiveness and providing students with richer and more engaging learning experiences.

VI. RECOMMENDATIONS

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

1. Secondary schools should strengthen ICT infrastructure. Public and private secondary schools in Uvwie Local Government Area should make deliberate efforts to provide functional computers, projectors, internet facilities, digital learning resources and other relevant ICT equipment. The provision of facilities should be accompanied by regular maintenance to ensure that available equipment remains functional.
2. Regular ICT training should be provided for teachers. School authorities and relevant educational agencies should organise periodic practical training and retraining programmes to improve teachers' digital competence. Such training should focus on practical classroom applications rather than only the theoretical knowledge of ICT.
3. Teachers should be encouraged to integrate ICT into routine teaching. Since the findings showed a difference between teachers' positive perceptions of ICT and their actual use of ICT materials, teachers should be encouraged to incorporate digital resources into lesson preparation, classroom presentation, assessment and students' learning activities where appropriate.
4. Government should improve electricity and internet access in schools. Reliable electricity and affordable, stable internet connectivity are essential for meaningful ICT integration. Educational authorities should therefore prioritise these basic infrastructural requirements, particularly in schools where unreliable power supply limits the use of digital facilities.
5. Schools should provide technical support. ICT integration can be frustrating when teachers encounter technical problems without assistance. Schools should therefore provide access to competent technical personnel who can maintain equipment, troubleshoot problems and support teachers when necessary.
6. ICT should be incorporated into continuous professional development. Teacher professional development programmes should include ICT and e-learning as continuing components. This would help teachers keep pace with emerging educational technologies and develop greater confidence in using digital resources.
7. Schools should promote equitable access to digital learning resources. Differences in access to technology between schools and between students should be reduced. This is particularly important because unequal access to digital resources may create further differences in students' educational opportunities and outcomes [1].
8. Educational administrators should monitor ICT utilisation. School administrators should not focus only on whether ICT equipment has been purchased or installed. They should also monitor how frequently and effectively the facilities are being used for teaching and learning and identify barriers preventing their utilisation.
9. Teachers should select ICT resources according to instructional needs. The use of technology should be guided by the learning objectives of each lesson. Teachers should select digital materials that genuinely improve explanation, understanding, interaction or assessment rather than using technology simply because it is available.

10. Further research should examine students' actual academic performance. Since the present study relied primarily on teachers' perceptions, subsequent studies should combine questionnaire responses with objective measures such as students' examination scores, academic records or experimental comparisons. Such research would provide stronger evidence regarding the actual effect of ICT and e-learning on academic achievement.

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