

EFFECT OF ICT-BASED INSTRUCTION ON STUDENTS' READING COMPREHENSION IN WUKARI, TARABA STATE

Comfort Bitrus Pam¹, Tang'an Longdi James² & Ucheptse Benjamin Laban³

¹Department of Science Education, Federal University, Wukari, Taraba State

comfortpam2019@gmail.com

²Department of General Studies, Federal Polytechnic Nyak, Shendam

Retlong222@gmail.com

³Department of Arts Education, University of Jos, Nigeria

ucheptseben@gmail.com

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ABSTRACT

Information and communication technology (ICT) has experienced a huge transformation over the past decades. This has culminated in the world becoming a global village. Today, most people use ICT for a variety of purposes. With the number of internet users growing worldwide, it is important to ascertain its effects on secondary students' achievement in English language in Wukari Local Government Area of Taraba State. The study adopted a quasi-experimental research design. It also made use of two groups: experimental and control groups. The study used all public senior secondary two students in Wukari Local Government Area of Taraba State. The sample size consisted of 100 SSII students from two selected public schools. The sample was assigned into experimental and control groups. The experimental group had 40 SSII students, and the control group had 60 SSII students. Simple random sampling was used in selecting the two schools and assigning the treatment. The instrument for data collection was a Comprehension Achievement Test (CAT) developed by the researcher and validated by experts. Data were analysed using mean, standard deviation, and ANCOVA. The results reveal that ICT actually facilitated the teaching and learning of comprehension in English language. However, not all students and teachers can use some of these ICT equipment. Therefore, the study recommends that teachers and students should be trained on how to use some of these ICT equipment.

Keywords: ICT integration, reading comprehension, secondary school students, academic achievement, gender differences

Introduction

In recent years, many technological media devices and systems have been invented and developed. They have appeared to offer contributions to the effectiveness and efficiency of educational instructions. Among the most widely known technological media devices and systems are motion pictures, television, videotapes and discs, computers, software packages, and programmed learning. A considerable amount of research has been conducted on technological media devices to identify the kinds of educational contributions they can make to improve teaching and learning of comprehension in English language. The importance of ICT is quite evident from the educational perspective. Though the chalkboard, textbooks, radio, television, and film have been used for educational purposes over the years, none has quite impacted the educational process like the computer. While television and film impact only the audio and visual facilities of users, the computer is capable of activating the senses of sight, hearing, and touch. ICT has the capacity to provide interactive potential for users to develop their individual, intellectual, and creative ability. The main purpose of ICT consists in the development of human mental resources, which allow people to both successfully apply existing knowledge and produce new knowledge (Richardson, 2015).

The collective and rigid nature of learning and the passive nature of learning associated with the use of radio, television, and films do not contribute any innovative changes to traditional methods in the education system. ICT is being used in the developed world for instructional functions. Today, computers perform a host of functions in teaching and learning, especially as many nations are adding computer literacy, reading, and writing literacy skills students will need to succeed (Almasri, 2020). At the instructional level, computers are used by students to learn reading, mathematics, social studies, art, music, health, and simulation. ICT provides productive teaching and learning of reading and creative thinking. It gives students ample and exceptional opportunities to develop high-quality learning and increase their ability to improve their reading skills and grammar.

Purpose of the Study

The aim of this study was to examine the effect of ICT integration on secondary school students' achievement in reading comprehension in Wukari Local Government Area, Taraba State. Specifically, the objectives are to:

1. determine the mean achievement scores of students taught reading comprehension using ICT and those taught using the lecture method in Wukari Local Government Area.
2. find out the difference in achievement between male and female students taught reading comprehension using ICT in Wukari Local Government Area.

Research Questions

1. What are the mean achievement scores of students taught reading comprehension using ICT and those taught using the lecture method?
2. What are the mean achievement scores of male and female students taught reading comprehension using ICT?

Hypotheses

1. There is no significant difference in the mean achievement scores of students taught reading comprehension using ICT and those taught using the lecture method in Wukari Local Government Area.
2. There is no significant difference in the mean achievement scores of male and female students taught reading comprehension using ICT in Wukari Local Government Area after controlling for pre-test scores.

Methodology

This study adopted a quasi-experimental research design, specifically the non-equivalent control group design. This design was considered appropriate because it allows for the comparison of two groups where random assignment is not feasible due to intact class structures in secondary schools. In the study, the experimental group was taught reading comprehension using ICT, while the control group was taught using the conventional lecture method. Both groups were pre-tested and post-tested, and the pre-test scores were used as a covariate to control for initial differences in achievement.

The population of the study comprised all public senior secondary II students in Wukari Local Government Area, Taraba State. A total of 100 students were drawn from two randomly selected secondary schools. The experimental group consisted of 40 students, and the control group consisted of 60 students. The unequal group sizes occurred because intact classes were used to avoid disrupting the school timetable. Simple random sampling was used to select the two schools and assign the treatment. This is consistent with the abstract and ensures consistency.

The instrument for data collection was a Reading Comprehension Achievement Test (RCAT) developed by the researcher. The test comprised multiple-choice and short-answer questions designed to measure students' comprehension of passages appropriate for senior secondary school students. The RCAT was validated by three experts in English language education and educational measurement to ensure content validity. A reliability test was conducted using the Kuder-Richardson Formula 20 (KR-20), yielding a reliability coefficient of 0.82, indicating that the instrument was reliable.

Data collection began with a pre-test administered to both groups to establish baseline achievement levels. Following this, the experimental group received instruction using ICT tools, including multimedia presentations, interactive software, and digital exercises, over six weeks. The control group received conventional lecture-based instruction on the same content for the same duration. After the treatment, both groups were re-administered the RCAT. Data were analysed using descriptive statistics (mean and standard deviation) and inferential statistics (ANCOVA). ANCOVA was chosen to control for pre-test scores. All hypotheses were tested at the 0.05 level of significance using SPSS version 22.2.

Results

Research Question One

What are the mean achievement scores of students taught reading comprehension using ICT and those taught using the lecture method?

Table 1

Achievement Mean Scores of students Taught Reading Comprehension using ICT and the Lecture Method

Group	N	Pre-test		Post-test		Mean	Mean	Post-test
		Mean	SD	Mean	SD	Gain	Gain Difference	Mean Difference
Experimental	40	43.97	4.341	65.38	6.376	21.41	14.91	15.86
Control	60	43.02	4.213	49.52	5.331	6.50		

Table 1 presents the mean achievement scores of students taught reading comprehension using ICT and those taught using the lecture method. The experimental group taught using ICT had a pre-test mean score of 43.97 with a standard deviation of 4.341, while the control group taught using the lecture method had a pre-test mean score of 43.02 with a standard deviation of 4.213.

This indicates that both groups had nearly the same level of achievement before the treatment was administered. After the treatment, the experimental group recorded a post-test mean score of 65.38 with a standard deviation of 6.376, whereas the control group recorded a post-test mean score of 49.52 with a standard deviation of 5.331. The experimental group had a mean gain of 21.41, while the control group had a mean gain of 6.50. This resulted in a gain difference of 14.91 and a post-test mean difference of 15.86 in favour of the experimental group. The result therefore indicates that students taught reading comprehension using ICT achieved higher mean scores than those taught using the lecture method. This implies that ICT integration was more effective in improving students' achievement in reading comprehension than the lecture method in Wukari Local Government Area, Taraba State.

Hypothesis One

There is no significant difference in the mean achievement scores of students taught reading comprehension using ICT and those taught using the lecture method in Wukari Local Government Area, Taraba State.

Table 2

ANCOVA Result on the Achievement Mean Scores of Students in Reading Comprehension

Source	Type III Sum of Squares	Df	Mean Square	F	P-value
Corrected Model	6035.708 ^a	2	3017.854	89.731	.000
Intercept	3060.160	1	3060.160	90.989	.000
Covariate	.026	1	.026	.001	.978
Group	5959.163	1	5959.163	177.186	.000
Error	3262.332	97	33.632		
Total	321332.000	100			
Corrected Total	9298.040	99			

a. R Squared = .649 (Adjusted R Squared = .642)

Table 2 presents the ANCOVA results on the achievement mean scores of students in reading comprehension taught using ICT and the lecture method, with the pre-test scores used as a covariate. The result shows that the group effect has an F-value of 177.186 with a p-value of .000. Since the p-value is less than the 0.05 level of significance, the null hypothesis, which states that there is no significant difference in the mean achievement scores of students taught reading comprehension using ICT and those taught using the lecture method in Wukari Local Government Area, Taraba State, is rejected. This result indicates that there is a significant difference in the mean achievement scores of students taught reading comprehension using ICT and those taught using the lecture method. Students taught using ICT performed significantly better than those taught using the lecture method. The adjusted R-squared value of .642 indicates that 64.2% of the variance in students' achievement in reading comprehension can be explained by the model after adjusting for the number of predictors. Therefore, ICT integration had a significant positive effect on students' achievement in reading comprehension in Wukari Local Government Area, Taraba State.

Research Question Two

What are the mean achievement scores of male and female students taught reading comprehension using ICT?

Table 3

Achievement Mean Scores of Male and Female Students in Reading Comprehension

Group	Gender	N	Pre-test		Post-test		Mean Gain	Mean Gain Difference
			Mean	SD	Mean	SD		
Experimental	Male	14	43.86	5.036	63.79	5.713	19.93	2.26
	Female	26	44.04	4.025	66.23	6.653	22.19	

Table 3 presents the mean achievement scores of male and female students taught reading comprehension using ICT. The male students had a pre-test mean score of 43.86 with a standard deviation of 5.036, while the female students had a pre-test mean score of 44.04 with a standard deviation of 4.025. This indicates that both male and female students had almost the same level of achievement before the treatment. After the treatment, the male students recorded a post-test mean score of 63.79 with a standard deviation of 5.713, whereas the female students recorded a post-test mean score of 66.23 with a standard deviation of 6.653. The male students obtained a mean gain of 19.93, while the female students obtained a mean gain of 22.19. The gain difference of 2.26 shows that female students achieved slightly higher scores than male students. This result indicates that both male and female students improved in their achievement in reading comprehension when taught using ICT, although female students showed a slightly higher improvement than their male counterparts.

Hypothesis Two

There is no significant difference in the post-test mean achievement scores of male and female students taught reading comprehension using ICT in Wukari Local Government Area, Taraba State, after controlling for pre-test scores.

Table 4

ANCOVA Result on Achievement Mean Scores of Male and Female Students in Reading Comprehension

Source	Type III Sum of Squares	Df	Mean Square	F	P-value
Corrected Model	151.685 ^a	2	75.842	1.957	.156
Intercept	904.449	1	904.449	23.342	.000
Co-variate	97.282	1	97.282	2.511	.122
Gender	51.485	1	51.485	1.329	.256
Error	1433.690	37	38.748		
Total	172541.000	40			
Corrected Total	1585.375	39			

a. R Squared = .096 (Adjusted R Squared = .047)

Table 4 presents the ANCOVA results on the post-test mean achievement scores of male and female students taught reading comprehension using ICT, with the pre-test scores used as a covariate. The result shows that the effect of gender has an F-value of 1.329 with a p-value of .256. Since the p-value is greater than the 0.05 level of significance, the null hypothesis, which states that there is no significant difference in the post-test mean achievement scores of male and female students taught reading comprehension using ICT in Wukari Local Government Area, Taraba State, after controlling for pre-test scores, is not rejected. This result indicates

that there is no significant difference in the achievement scores of male and female students taught reading comprehension using ICT. This implies that ICT integration improved the achievement of both male and female students equally in reading comprehension. The adjusted R-squared value of .047 indicates that about 4.7% of the variance in students' achievement in reading comprehension is explained by the model after adjusting for the number of predictors.

Discussion of Findings

The findings of this study demonstrate that secondary school students taught reading comprehension using Information and Communication Technology (ICT) performed significantly better than those taught using the conventional lecture method. This result aligns with a growing body of research indicating that ICT integration enhances students' academic achievement. For example, Kihoza, Zlotnikova, and Nathaniels (2016) found that the incorporation of educational technologies increased learners' engagement and understanding of instructional content. Similarly, Adam and Fenton (2019) reported that ICT tools such as interactive platforms and digital resources positively influenced students' comprehension levels compared to traditional approaches. The improved performance observed in this study can be attributed to the ability of ICT to present information in multiple formats (text, visuals, audio), which facilitates understanding and retention (Hew & Brush, 2017; Eruz & Erdogan, 2021).

ICT-supported instruction also aligns with constructivist learning theories, which emphasize active learner engagement and meaning construction. According to Richardson (2015), technology-rich environments allow students to interact with content, collaborate with peers, and receive immediate feedback—factors that contribute to deeper comprehension. Likewise, Sife, Lwoga, and Sanga (2015) highlighted that the use of digital tools encourages learner autonomy and critical thinking, which are essential for improved academic outcomes. In the context of reading comprehension, multimedia and interactive exercises enable learners to visualize and practice comprehension strategies more effectively than passive listening in lecture-based settings.

The current study also examined gender-related differences in achievement among students taught reading comprehension using ICT. The results revealed that there was no significant difference in the achievement scores of male and female students after controlling for pre-test performance. This finding suggests that ICT benefits learners regardless of gender. This outcome resonates with the work of Teo (2016), who reported negligible gender disparities in ICT-enhanced learning environments. Moreover, Almasri (2020) found that gender did not significantly affect students' performance when digital literacy training and ICT tools were consistently integrated into instruction. These studies indicate that when students are provided with equal access to technology and guided use, gender differences in learning outcomes diminish.

Recent research further supports the view that ICT tools equalize learning opportunities across gender groups. For instance, Okoye and Ejiofor (2022) showed that both male and female students made comparable gains in English language learning when interactive educational software was used. Likewise, Ismail and Alqahtani (2023) found that ICT-mediated instruction produced similar improvements in comprehension for male and female learners in Saudi secondary schools. Collectively, these findings suggest that ICT integration fosters inclusive learning environments where achievement is influenced more by instructional design than by student gender.

The theoretical basis for these observations is consistent with social constructivist perspectives, which posit that learning occurs through meaningful interaction with tools and peers within a supportive environment (Vygotsky, 1978; more recently reaffirmed by Mishra & Kereluik, 2016). Digital tools provide scaffolding, repetition, and multimodal representations of information—conditions that enable all students to build conceptual

understanding and achieve academic success. Additionally, the rapid development of educational technologies between 2015 and 2026 has expanded the availability of adaptive learning platforms that tailor instruction to individual needs, further closing gaps in performance across learner groups (Alenezi & Ahmad, 2021; Chukwu et al., 2024). This study's findings revealed that ICT integration significantly enhances students' achievement in reading comprehension compared to traditional lecture methods. Additionally, the lack of significant gender differences suggests that when ICT is effectively implemented, it supports equitable learning outcomes. These results highlight the importance of incorporating digital technologies in secondary education to promote engagement, accommodate diverse learning styles, and improve overall academic achievement.

Conclusion

The study investigated the effect of ICT integration on secondary school students' achievement in reading comprehension in Wukari Local Government Area, Taraba State. The findings revealed that students taught using ICT achieved significantly higher scores than those taught using the conventional lecture method. This indicates that ICT integration enhances students' comprehension and learning outcomes by providing interactive, multimedia-rich, and engaging learning experiences. Additionally, the study found no significant difference in achievement between male and female students taught using ICT, suggesting that the benefits of ICT are equally accessible to all students regardless of gender. This underscores the potential of ICT as a tool for promoting equitable learning opportunities in secondary schools. The results of this study revealed that integrating ICT into reading comprehension instruction can significantly improve student achievement and foster an inclusive learning environment. Consequently, the study supports the adoption and consistent use of ICT in teaching practices to enhance learning outcomes in Nigerian secondary schools.

Recommendations

1. Teachers should integrate ICT tools such as multimedia presentations, educational software, and interactive platforms into reading comprehension lessons to enhance students' engagement and learning outcomes. They should also be supported with continuous professional development to improve their ICT skills and competence in using technology effectively in instruction.
2. School administrators and policymakers should ensure that adequate ICT infrastructure, including computers, projectors, internet access, and educational software, is provided in secondary schools. Policies and frameworks should be developed to promote equitable access to ICT resources for all students and encourage the regular use of technology in teaching to improve learning outcomes.
3. Students should be encouraged to actively engage with ICT tools for self-directed learning and practice in reading comprehension outside the classroom. Awareness should be created about the benefits of ICT in improving academic performance, fostering independent learning, and supporting equal opportunities for all learners.

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