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EFFECT OF SCREEN READING ON STUDENTS' ACHIEVEMENT IN READING COMPREHENSION

[1]Cynthia Obiageli Nnamani, [2]Eugenia Ada Amadi
[1-2]Enugu State University of Science and Technology, Agbani
[1]obiageli.nnamani@esut.edu.ng, [2]eugenia.amadi@esut.edu.ng

ABSTRACT

The acquisition of reading proficiency in childhood is a critical foundation for higher education achievement; however, a persistent reading inertia among Nigerian undergraduates threatens the attainment of Sustainable Development Goal (SDG) 4, which emphasizes the need for children to acquire foundational reading skills by age ten. To investigate a potential intervention, this quasi-experimental study examined the effect of screen-based reading on reading comprehension achievement. Employing a non-equivalent, non-randomized controlled group design, 72 randomly selected undergraduates from the Department of English and Literary Studies at ESUT during the 2022/2023 session were assigned to either an experimental group, which used electronic reading materials, or a control group, which used traditional print materials. Data collected from pre-tests and post-tests were analyzed using Means, Standard Deviation, and Analysis of Covariance (ANCOVA). The results indicated that while the screen-based reading group performed slightly better, the difference was not statistically significant, leading to the conclusion that screen-based reading did not substantially improve comprehension. Consequently, the study recommends that to effectively address the learning poverty crisis, undergraduates should be encouraged to utilize both digital and print platforms for reading.

Key Words: Print Reading, Reading Comprehension, Reading Proficiency, Screen-Based Reading

INTRODUCTION

Education is a fundamental human need and the bedrock of societal development, a status underscored by its position as the fourth United Nations Sustainable Development Goal (SDG 4). This goal mandates ensuring inclusive and equitable quality education for every child by 2030, a target for which reading proficiency is absolutely crucial.

As Kabir and Jeromes (2022, p.51) assert, 'in the context of education, a large amount of reading is essential because all learning activities involve reading skills and the success of students' study also depends on the greater part in their ability to read.'

Kabir and Jeromes' (2022) assertion is borne out by the stark contrast in outcomes; children who acquire reading skills early consistently excel academically, whereas those who do not often face persistent struggles not only in school but in broader life activities (Vuoug, Nguyen, and Tri, 2021).

In the contemporary era, defined by globalization and an information revolution, the expected outcomes of education have expanded to include digital literacy, specifically the ability to read proficiently from screens and digital devices. This shift is recognized at the global level.

Adipat and Chotikapanich (2022) notes that international bodies like the United Nations are monitoring how educational systems adapt to this critical student need. However, the Nigerian context presents a significant challenge.

As highlighted by Agbo et al. (2019), most schools lack both the qualified reading teachers and the technological infrastructure necessary to foster these digital reading skills. Consequently, there exists a profound disconnect between policy and practice: while the official English Language Curriculum for Primary 1-3 explicitly aims to develop learners' reading ability and communicative competence (NERDC, 2012), the reality on the ground falls severely short of this objective.

A body of research (e.g., Oluyomi and Yilep, 2022' Ihedioha, 2021; and Musa et al., 2021) consistently reports a critically low reading level among Nigerian school children. This foundational deficit creates a ripple effect, resulting in a significant number of struggling readers at both the secondary and university levels.

Typically, when Nigerian university students do engage with books, they are predominantly academic texts read for the instrumental purpose of passing examinations, rather than for broader knowledge or pleasure. However, a potential shift has been noted in the wake of the COVID-19 pandemic.

According to studies by Yusof (2021), Kabir and Jeromes (2022), and Ogunbodede and Sawyerr-George (2023), the confluence of school shutdowns and increased access to digital media appears to have spurred a growth in student interest in reading. This new engagement is primarily manifested through screen-based reading, as students increasingly use phones and computers to access both general information and educational content.

Screen reading, defined as the act of reading from a digital device such as a phone, laptop, or tablet, has fundamentally altered the traditional concept of reading by incorporating dynamic elements from social media, including acronyms and emojis (Pae, 2020). While this medium offers benefits like convenience, accessibility, and enhanced visual engagement, its ultimate value in an academic context is measured by reading comprehension.

For university students, comprehension is paramount, as a core objective of higher education is the critical engagement with texts to produce new knowledge—a feat only possible when students can construct a deep mental representation of written information (Pena & Luque-Rojas, 2021).

The complex nature of this process is explained by major theoretical frameworks. The Simple View of Reading (SVR) model posits that comprehension is the product of two core skills: word decoding and linguistic comprehension (Gough & Tunmer, 1986).

Building on this, the Reading Systems Framework (RSF) elaborates that successful comprehension requires the automatic decoding of word meanings and their subsequent integration into a coherent mental model of the text, a process heavily reliant on the reader's background knowledge (Perfetti & Stafura, 2014).

Collectively, these models demonstrate that reading comprehension is a complex cognitive act; learners who fail to effectively merge information from the text with their prior knowledge will inevitably struggle to achieve deep understanding (Nnamani, 2021).

Background knowledge, which is significantly built through the cumulative volume of books a learner has read, plays a critical role in comprehension. Research by Snow, Serry, and Hommand (2021) indicates that this knowledge impacts readers differentially; for instance, readers with low background knowledge benefit more from well-structured, cohesive texts, while a strong knowledge base can help weaker readers compensate for underdeveloped skills.

This suggests that avid readers, who possess a broader reservoir of prior knowledge across diverse subjects, typically demonstrate superior comprehension compared to their more reluctant peers. Given that screen reading has been observed to revitalize reading engagement among Nigerian university students, this study aimed to investigate whether this digital mode of reading translates into a tangible improvement in achievement in reading comprehension.

LITERATURE REVIEW

A significant body of research has explored the relationship between screen reading and reading comprehension, revealing a complex and often contradictory picture in the Nigerian context. For instance, while Yusufi and El-Yakubu (2020) found that using ICT mediums improved reading comprehension outcomes for secondary school students, other studies highlight substantial challenges.

Oji and Erubami (2020) demonstrated that social media use did not improve the reading culture of youths, and Ovu et al. (2022) found that many tertiary students in Southeastern Nigeria actually preferred print to screen reading due to digital distractions.

Further complicating the issue, Nnanwuba et al. (2019) noted that excessive screen time could displace studying, and Sekinat and Quadri (2022) identified infrastructural barriers like epileptic power supply and poor internet connectivity as major hindrances to the effective use of e-resources, even when students were motivated to use them for academic purposes. This collection of studies suggests that while digital reading holds potential, its benefits are not automatic and are mediated by factors such as platform, purpose, and infrastructural support.

Research in developed countries presents a nuanced and often conflicting picture regarding the impact of new technologies on reading comprehension. For instance, while Mangen et al. (2019) found that overall comprehension levels between print and Kindle readers were identical, print readers demonstrated a superior ability to construct a coherent spatial representation and organization of a narrative.

The potential benefits of technology are highlighted by Capodieci et al. (2020), who showed that a specific digital tool, a cloze app, could effectively improve inference-making skills. However, the medium's drawbacks become apparent under pressure. Delgado et al. (2021) discovered that screen readers are more prone to shallow processing and comprehend less when under time constraints compared to their print-based counterparts.

This conflict extends to cognitive load, with studies like Zivan et al. (2023) reporting increased cognitive load during screen reading, while Bruggemann et al. (2022) found no significant differences in cognitive load across paper-based and computer-based tests.

Ultimately, the effectiveness of digital reading may depend heavily on its specific implementation, as demonstrated by Wang (2022), whose study revealed that learner-generated pictures enhanced Chinese digital reading comprehension more effectively than teacher-provided ones, suggesting that interactive engagement is a critical variable.

Comparative studies on reading medium continue to yield critical insights into its effect on comprehension and behavior. Research by Støle et al. (2020) with 10-year-olds in Norway found that students, on average, scored higher on a paper-based comprehension test than on its digital equivalent, with nearly a third performing markedly better in print.

The negative effect of screen reading was most pronounced among high-performing girls, a disparity the researchers attributed to factors like scrolling and potentially misplaced digital reading habits. This suggests that the medium itself can impose cognitive costs.

Conversely, a study by Grancha et al. (2022) of university students who preferred digital texts revealed a different dynamic: while these students demonstrated longer reading times for both

comprehension and word recognition tasks on paper, their reading times across the two mediums were strongly correlated.

This indicates that individual reading habits persist regardless of format, but the efficiency and ultimate effectiveness of screen reading may not always align, pointing to a complex interplay between medium, habit, and performance.

Shifting focus to psychological factors, several scholars have investigated how perception and motivation influence children's engagement with screen and print reading. Kaban and Karadeniz (2021), for instance, studied sixth-graders' perceptions of various electronic reading practices (personalized, gamified, PDF) in an English as a Foreign Language (EFL) context. They found that while screen reading had the potential to significantly increase student motivation, it did not lead to a corresponding improvement in reading comprehension, as no significant difference in comprehension levels was observed between the experimental and control groups. This disconnect between engagement and learning outcome is echoed in broader research.

A meta-analysis by Furenes et al. (2021) of 39 studies found that, on average, children's story comprehension was lower with digital books compared to print. Crucially, the analysis highlighted that the adult support typically present during print book reading was more effective for comprehension than the digital enhancements (like animations or games) in books children read independently, suggesting that the social interaction around print may be a key component of its value.

Research into the challenges of reading comprehension in Nigeria has primarily focused on foundational barriers. Studies by Agbo et al. (2019) and Musa et al. (2021) identify critical impediments at the secondary school level, including inadequate teacher qualifications, a lack of instructional materials, and students' poor educational backgrounds.

Concurrently, the global shift towards digital text has introduced a new layer of complexity. Investigations into digital reading practices, such as the work of Radiatan and Nyimai (2021), reveal habits like skimming and multi-tasking that can undermine deep comprehension, particularly with complex academic texts. This is compounded by findings from scholars like Hakemulder and Mangen (2024), who suggest that frequent digital reading may erode the capacity for reflective thought essential for understanding.

A critical gap, however, exists in the literature. While these studies illuminate the challenges in secondary education and the general effects of digital reading, there is a lack of focused research on how screen reading specifically impacts the reading comprehension achievement of first-year university students in Nigeria.

First-year students are uniquely vulnerable, transitioning to higher education while navigating

an increasingly digital academic landscape. Therefore, this study sought to fill this gap by directly investigating the effect of screen reading on the reading comprehension achievement of Nigerian university students, providing much-needed evidence for this pivotal educational stage.

STATEMENT OF PROBLEM

The persistently low reading comprehension levels among Nigerian students remain a significant concern for educators, parents, and policymakers. Prevailing research attributes this challenge to a deeply rooted poor reading culture and inadequate instructional methods in schools. While various solutions have been explored, the potential of screen-based reading remains critically underexamined.

A pivotal shift is now underway: the digital revolution has demonstrably increased reading engagement among students, albeit primarily on screens. This new reality necessitates a direct investigation to determine whether this surge in screen reading correlates with improved achievement in reading comprehension, thereby offering a novel pathway to address a longstanding educational crisis.

RESEARCH QUESTION

This research question guided the study:

1. What is the differential effect of screen reading on students' achievement in reading comprehension?

THEORETICAL FRAMEWORK

This study was anchored in Kintsch's (1998) Construction-Integration (C-I) model of reading comprehension, which delineates the cognitive architecture of how readers build meaning from text.

Kabir and Jeromes (2022, p.51) assert, Kabir and Jeromes (2022, p.51) assert, the model posits a two-phase process. The initial construction phase involves generating a text-based representation from the words and sentences. The subsequent integration phase is a cyclical process where this textual information is actively integrated with the reader's pre-existing general knowledge to form a coherent and stable mental model, or "situation model," of the text. The core tenet of the theory is that comprehension emerges from the dynamic interplay of bottom-up (text-driven) and top-down (knowledge-driven) processes.

This framework is particularly illuminating for understanding the challenges faced by second language (L2) readers. As Xiao (2016) argues from a C-I perspective, L2 readers often possess less automated linguistic knowledge and may lack the specific sociocultural background information required for seamless integration.

Consequently, the students tend to rely more heavily on slow, effortful bottom-up processing of the text itself. While this can lead to competence in literal comprehension where answers are directly stated, they often struggle with inferential

questions that demand the application of culturally-specific background knowledge to construct a coherent situation model. Thus, the C-I model provides a powerful lens for analyzing how the medium of reading (screen vs. print) might interact with these fundamental cognitive processes, especially in an L2 context like Nigeria.

METHODOLOGY

This study employed a quasi-experimental design, utilizing a non-equivalent, non-randomized controlled group approach. The population consisted of 120 students from the Department of English and Literary Studies at ESUT during the 2022/2023 academic session.

Participants were purposively assigned to either an experimental or a control group. A pre-test was administered to both groups to establish a baseline for reading comprehension. The intervention spanned six weeks and was based on the Creative Writing course (ELS 101). The experimental group received all reading materials in electronic format, while the control group used equivalent materials in print.

Instruction was conducted separately on different days to prevent cross-contamination between the groups. Following the intervention, a post-test was administered. From the initial pool, a final sample of 70 participants who completed and submitted both the pre-test and post-test was used for data analysis.

The collected data were analyzed using descriptive statistics (Means and Standard Deviation) and inferential statistics, specifically Analysis of Covariance (ANCOVA), to compare the post-test results while controlling for pre-test differences.

RESULTS

The study sought to answer this research question: What is the differential effect of screen reading on students' achievement in reading comprehension? The findings are presented in Table 1.

Table 1
Mean Achievement Scores of Students Who Engaged in Screen and Print Reading

Dependent Variable: Posttest

Method	Mean	Std. Deviation	N
Experiment	65.7222	18.11741	36
Control	58.2778	16.42230	36
Total	62.0000	58.22951	72

Data analysis revealed a difference in reading comprehension achievement between the two groups. The experimental group (screen reading) demonstrated a higher mean achievement score (M = 65.72) compared to the control group (print reading; M = 58.28), as detailed in Table 1.

The observed difference was subjected to further statistical testing, and the analysis of between-subjects effects (Table 2) confirmed that the superior performance of the screen reading group was statistically significant.

Table 2
Tests of Between-Subjects Effects

Dependent Variable: Post test

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2323.022[a]	2	1161.511	.336	.716	.010
Intercept	21201.469	1	21201.469	6.136	.016	.082
Method	1488.888	1	1488.888	.431	.514	.006
Pretest	1325.467	1	1325.467	.384	.538	.006
Error	238414.978	69	3455.290			
Total	517506.000	72				
Corrected Total	240738.000	71				

a. R Squared = .010 (Adjusted R Squared = -.019)

The analysis of covariance, controlling for pre-test scores, revealed no statistically significant difference in reading comprehension achievement between the experimental (screen reading) and control (print reading) groups ($F(1, 69) = 0.431$, $p = 0.514$). As indicated in Table 2, while the experimental group's mean score was descriptively higher, this difference was not significant. This result suggests that, for this population, the mode of reading—whether screen or print—did not exert a significant effect on comprehension achievement.

DISCUSSION

The results of this study indicated that while students in the screen-reading group descriptively outperformed their print-reading counterparts (as shown in Table 1), an Analysis of Covariance (ANOVA) revealed this difference was not statistically significant (Table 2).

This finding aligns with a body of international research suggesting that the reading medium itself may not be a decisive factor for comprehension. It corroborates the work of Mangen et al. (2019), who found nearly identical comprehension levels between print and Kindle readers, and echoes the results of Kaban and Karadeniz (2021), who observed no significant comprehension gains from digital reading among sixth-grade students.

A central explanation for this outcome may lie in the cognitive demands of reading comprehension, which extend beyond mere text decoding. As supported by Xiao's (2016) application of the Construction-Integration model, L2 readers often struggle with inferential questions that require specific sociocultural background knowledge.

The comprehension instrument in this study, derived from a creative writing text by a foreign author, likely posed such a challenge. It is plausible that the participants, potentially accustomed to less complex digital content, lacked the necessary cultural schema to construct

a deep mental model of the text, regardless of the medium.

Furthermore, contextual and environmental factors cannot be overlooked. The findings resonate with studies highlighting how infrastructural deficits, such as the epileptic power supply and poor internet connectivity noted by Sekinat and Quadri (2022), can hinder consistent engagement with digital resources.

This, coupled with broader socio-economic challenges and a persistent poor reading culture as identified by Oji and Erubami (2022), may have demotivated students and diluted the potential benefits of either reading platform, resulting in comparable performance.

CONCLUSION

This study concluded that screen-based reading did not confer a significant advantage over print reading in enhancing reading comprehension for the studied population. Therefore, the learning poverty crisis in Nigerian universities cannot be resolved by the adoption of digital reading platforms alone; a more holistic strategy that integrates pedagogical, cognitive, and environmental factors is required.

This study's conclusion, however, stands in contrast to research such as that of Yusufi and El-Yakubu (2020), which found a significant advantage for ICT-based instruction. This discrepancy underscores the inconclusive nature of the literature on screen reading, suggesting that its efficacy is likely moderated by a complex interplay of factors including text genre, reader proficiency, cultural context, and environmental support, rather than the medium alone.

RECOMMENDATION

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

1. Educational institutions and curriculum developers should promote the strategic use of both print and digital reading platforms. Rather than favoring one medium over the other, pedagogical guidance should be developed to teach students *when* and *how* to use each format effectively. For instance, print could be emphasized for deep, analytical reading of complex texts, while digital tools could be leveraged for research, collaboration, and accessing updated information.
2. To address the comprehension challenges linked to a lack of background knowledge, instruction must explicitly focus on building cultural and disciplinary schema. For reading materials from foreign or unfamiliar contexts, educators should provide pre-reading activities that build necessary background knowledge. Furthermore, critical literacy skills should be taught to help students interrogate texts, understand authorial perspective, and make inferences, thereby strengthening their ability to construct meaning independently of the reading medium.

3. Policymakers and university administrations must recognize that the potential of digital reading is contingent on reliable infrastructure. Investments are urgently needed to ensure stable electricity, affordable internet access, and digital resource centers on campus. Concurrently, digital literacy training programs should be implemented to equip students with skills beyond basic navigation—including managing digital distractions, evaluating online information, and using digital tools for deep learning rather than superficial skimming.

SUGGESTIONS FOR FURTHER RESEARCH

To build upon the insights of this study, the following avenues for future research are suggested:

1. Future studies could compare comprehension outcomes across different genres (e.g., narrative fiction vs. expository scientific texts) and media (print vs. screen). This would help determine if certain types of texts are better suited to a specific medium, allowing for more nuanced recommendations.
2. Research is needed to examine whether and how built-in digital tools (e.g., highlighting, note-taking, dictionary lookup) can facilitate deeper engagement and improve comprehension for L2 readers, potentially offsetting the disadvantages of shallow screen reading.
3. A long-term study tracking students' reading habits, comprehension scores, and overall academic performance over several years would provide valuable data on the sustained impact of screen reading on literacy development and critical thinking skills in the Nigerian university context.
4. Further research should deliberately investigate how factors like socio-economic status and gender mediate the effectiveness of screen reading. This could uncover whether digital solutions are exacerbating existing inequalities or providing new opportunities for specific student subgroups.

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