EFFECT OF HUMAN-AI COLLABORATION ON READING COMPREHENSION AMONG SECONDARY SCHOOL STUDENTS IN OBUDU EDUCATION ZONE, CROSS RIVER STATE

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Abstract
This study explored the effect Human–Artificial Intelligence (AI) collaboration on reading comprehension among secondary school students in Obudu education zone, Cross River state, Nigeria. Three objectives and research questions have guided the study. A quasi-experimental research design was adopted for the study. The sample consisted of 200 senior secondary school (SS II) students drawn from selected public secondary schools and assigned to experimental and control groups. The experimental group received AI-assisted reading instruction integrated with teacher guidance, while the control group was taught using conventional teacher-centered method. Data were collected using a Reading Comprehension Achievement Test (RCAT) and using the Pearson Product-Moment Correlation, a coefficient of 0.82 was established. Research questions were analyzed using mean and standard deviation. Findings revealed that students exposed to Human–AI collaborative instruction performed significantly better than their counterparts in the control group. The experimental group demonstrated higher levels of reading comprehension, learner engagement, and interest in reading activities. The study concluded that Human–AI collaboration is a viable approach for improving reading comprehension in secondary schools. It therefore recommended the adoption of AI-supported instructional strategies and teacher training programs to strengthen literacy instruction and enhance students' reading outcomes in Nigerian secondary schools.
Keywords: Human–AI collaboration; Reading comprehension; Secondary school students.

Introduction

Education, at its very core, is a human enterprise built on relationships, communication, and the shared pursuit of knowledge. For decades, Nigerian classrooms have been defined by the familiar rhythm of chalk against the board, teachers' voices guiding students through lessons, and learners striving to make meaning from text and experience. Yet, as society evolves, so do the tools and expectations of learning. The modern learner now exists in an age where information flows faster than ever before, and where reading and comprehension extend far beyond printed pages into digital, multimedia, and interactive environments.

This rapid shift has placed increasing pressure on educators to adapt methods that not only sustain learners' interest but also develop deeper comprehension skills (Adewale & Musa, 2023; Santosa, Wijaya, & Rahman, 2023). In secondary schools across Nigeria, and particularly in Cross River state, the ability to read and understand texts remains a core challenge. Many students struggle with comprehension, inference, and vocabulary development difficulties often traced to rote teaching methods, insufficient instructional materials, and large class sizes (Ayodeji & Akinwumi, 2025). Reading lessons are often dominated by teacher talk, leaving little room for learner interaction, feedback, or critical engagement. Consequently, students' motivation to read and their capacity to construct

meaning independently are diminished. These issues are especially pronounced in rural and semi-urban zones such as Obudu, where schools face limited access to digital resources, inconsistent internet connectivity, and minimal exposure to modern literacy technologies (Maduabuchi & Emechebe, 2024).

Against this backdrop, Artificial Intelligence (AI) emerges not merely as a technological breakthrough but as a new partner in teaching and learning. Rather than replacing teachers, AI offers tools that can support them acting as an assistant that adapts reading materials to individual learners' levels, provides instant feedback, and monitors progress over time (lamri & Watson, 2023; Rudolph et al., 2023). For students who struggle with comprehension, AI-based reading applications and chatbots can help break down complex passages, highlight key ideas, and generate guiding questions. These interactive systems create an environment where learning becomes dialogic and personalized, helping learners engage at their own pace while teachers focus on higher-order thinking tasks and creative facilitation (Pérez, Kuperman, & Larrañaga, 2020).

However, the path toward integrating such human AI collaboration in Nigeria's secondary schools is neither straightforward nor uniform. Studies across Africa indicate that while AI can significantly enhance engagement and comprehension, its impact depends heavily on context the readiness of teachers, infrastructure availability, and cultural acceptance of technology in pedagogy (David, Nnaemeka, Akuneme, & Nwosu, 2025; King, 2023). In many rural areas, teachers possess limited digital literacy and often perceive AI as a complex, foreign innovation rather than a pedagogical partner. This digital divide widens the gap between urban and rural schools and risks excluding students from the transformative potential of AI in education.

In the Obudu Education Zone, this gap is especially visible. Schools in this region often rely heavily on traditional instructional methods, with limited access to digital tools. Yet, the desire for improvement is strong among both teachers and students. Reading comprehension, a foundational literacy skill, is critical for students' academic success, yet remains persistently low. The introduction of AI-assisted reading instruction thus represents a potential bridge, a way to combine human creativity and empathy with machine precision and adaptability. It raises an important question: Can human AI synergy meaningfully improve reading comprehension among secondary school students in a resource limited context like Obudu education zone, Cross River state, Nigeria?

Therefore, the problem this research seeks to address is the persistent low achievement in reading comprehension among secondary school students despite numerous curriculum reforms and literacy interventions, coupled with the underutilization of emerging technologies like AI that could potentially support both teachers and learners. Although AI integration has gained momentum globally, empirical studies focusing on its application in reading comprehension within Nigeria especially in rural settings remain scarce. This absence of localized evidence limits informed policy decisions and practical adoption in the classroom.

The present study, therefore, investigates human AI synergy in enhancing reading comprehension among secondary school students in Obudu education zone, Cross River state.

It seeks to explore how collaborative interactions between teachers and AI-supported systems can foster deeper comprehension, learner engagement, and improved performance. Ultimately, the study aims to contribute to the growing body of evidence on technology-enhanced literacy development, demonstrating that the future of education in Nigeria may not lie in choosing between human and artificial intelligence but in finding meaningful ways to unite the two for the benefit of learners.

Despite increasing global awareness of Artificial Intelligence (AI) in education, the integration of human AI synergy in developing reading comprehension skills among secondary school students remains relatively underexplored, especially in sub-Saharan Africa. While advanced economies have documented significant success in AI-assisted literacy and adaptive learning systems (Rudolph et al., 2023; Alamri & Watson, 2023), there is a paucity of localized empirical evidence reflecting the realities of Nigerian classrooms. Most existing studies in Nigeria have focused on ICT integration or e-learning, often without distinguishing AI based instructional systems from general digital tools (Yusuf & El-Yakub, 2020). Consequently, the specific role of AI-supported instruction in reading comprehension enhancement among secondary learners in rural or semi-urban contexts like Obudu remains insufficiently investigated.

Furthermore, earlier research has tended to emphasize the technological or infrastructural aspects of AI adoption rather than its pedagogical implications (Adewale & Musa, 2023; Jin et al., 2024). There is limited exploration of how teachers and AI systems can co-function in the classroom where human intuition, empathy, and cultural understanding complement AI's analytical precision and personalized feedback capabilities. In Nigeria, particularly in Cross River State, studies addressing the interaction between teacher facilitation and AI reading tools are virtually non-existent. This leaves an empirical gap on how AI may support learners' comprehension processes, motivation, and metacognitive engagement in text interpretation.

Another major gap is the lack of context-sensitive models of AI implementation in literacy instruction. Many AI-based interventions are imported or designed for technologically advanced environments with stable connectivity, high digital literacy, and abundant resources (Pérez, Kuperman, & Larrañaga, 2020). These conditions contrast sharply with the realities of public secondary schools in rural areas such as Obudu, where infrastructural limitations, large class sizes, and limited teacher training persist (Ayodeji & Akinwumi, 2025). Training and retraining of teachers can enhance teaching performance in (AI), in service training of teachers bring new teaching pedagogy to the teacher's and boost intelligent quotient (Ubi, 2025). Hence, a localized empirical framework is needed to test whether human–AI collaboration can be effective even within resource-constrained educational settings. Moreover, most global studies focus on AI's cognitive contribution such as adaptive assessment or personalized feedback but pay less attention to its affective and social dimensions, including how it might influence students' interest, self-efficacy, and classroom participation (King, 2023). The gap here lies in understanding AI not just as a technological instrument but as a co-learning partner capable of

shaping learner attitudes and engagement. Addressing this will not only advance educational technology scholarship but also provide actionable insights for teachers and policymakers.

Therefore, this study responds to these gaps by situating AI-supported reading instruction within the real classroom ecology of Nigerian secondary schools, emphasizing human facilitation, learner experience, and context-specific implementation. It aims to provide evidence on whether AI-driven reading strategies, when combined with teacher mediation, can enhance comprehension outcomes and foster more interactive, learner-centered pedagogy in the Obudu Education Zone.

The present study draws from Vygotsky's (1978) Sociocultural Theory and the Human–AI Collaborative Learning Model (Huang et al., 2022) as its theoretical foundation. Vygotsky's Sociocultural Theory posits that learning occurs through social interaction and that cognitive development is mediated by tools, language, and collaboration. In traditional reading instruction, the teacher functions as the mediator guiding students through the Zone of Proximal Development (ZPD), the gap between what learners can do independently and what they can achieve with support. In a human–AI reading environment, AI becomes a new form of mediating tool, offering scaffolding, adaptive tasks, and feedback that extend learners' comprehension capacity. The teacher's role, however, remains indispensable providing emotional, cultural, and contextual guidance that machines cannot replicate (Vygotsky, 1978; Li & Chen, 2024). This theoretical alignment underscores that AI should not replace teachers but rather complement their mediating function.

The Human–AI Collaborative Learning Model further explains how humans and AI systems co-evolve in learning contexts. According to Huang et al. (2022), effective collaboration emerges when both entities contribute distinct strengths; humans provide creativity, empathy, and ethical judgment, while AI contributes computation, adaptation, and data analysis. Within reading comprehension instruction, AI can personalize text difficulty, highlight linguistic patterns, and monitor progress, whereas teachers interpret learner emotions, guide discussions, and maintain motivation. Together, they create a dynamic synergy that maximizes learning outcomes. This theoretical base provides the rationale for designing the present study as an inquiry into how AI-assisted reading instruction, guided by human mediation, can enhance students' comprehension in Nigerian secondary schools. It also aligns with the constructivist view that knowledge is actively constructed through experience and interaction, suggesting that when students engage with AI tools under teacher supervision, they construct meaning through both technological and human dialogue.

In summary, this theoretical framework establishes that meaningful learning emerges not from technology alone but from human AI collaboration a balanced partnership where technology supports instruction and teachers nurture understanding, emotion, and context. This balance forms the conceptual core of the current study.

Research Questions

The following research questions were raised based on the objectives of the study:

1. What is the effect of Human - AI collaboration instruction on secondary school students' performance in reading comprehension against the teacher centered method?

2. How does AI-supported instruction influence students' engagement and interest during reading comprehension lessons?
3. How does the interaction between teachers and AI tools improve instructional delivery and learner performance in reading comprehension?

Methodology

This study used a quasi-experimental pretest posttest control group design. This design is suitable because it compares how students taught with AI-assisted reading activities perform against those taught through the usual classroom methods. The area is made up of both rural and urban schools, many of which still depend on traditional teaching methods. The setting is ideal because it allows the researcher to test how AI tools can support reading comprehension in real school environments where technology use is still growing.

The population of the study includes all SS II students in public secondary schools in the Obudu education zone. From this population, 200 students were selected from four schools. Two schools served as the experimental group, and two as the control group. The sample is drawn using purposive and simple random sampling. Schools with basic digital facilities are purposely chosen, while random selection ensures fairness among classes. The main instrument for data collection is the Reading Comprehension Achievement Test (RCAT), designed by the researcher. It contains multiple-choice and short-answer questions that test students' understanding of main ideas, vocabulary, inference, and summary skills. For the experimental group, students also complete short reflective responses about their learning experience with the AI tool.

To ensure reliability, a pilot test will be conducted in a nearby school not included in the main study. The scores from two test administrations will be correlated using the Pearson Product-Moment Correlation formula, and a coefficient of 0.82 or above will confirm reliability. In the treatment stage, the experimental group was taught through Human AI collaboration. The teacher used AI-based reading platforms or Chabot's to guide lessons, ask comprehension questions, and provide instant feedback. The teacher acted as a facilitator, helping students interpret AI responses and discuss ideas. The control group, on the other hand, was taught the same reading passages using traditional teacher-led explanations and exercises. Both groups were taught for four weeks. After the lessons, a posttest was given to measure improvement in reading comprehension. Data was analyzed using mean and standard deviation to show performance trends .This method allows the researcher to see clearly how AI-assisted learning compares with regular teaching in improving students' reading comprehension in secondary schools.

Results

Research question one: What is the effect of Human - AI collaboration instruction on secondary school students' performance in reading comprehension against the teacher centered method?

Table 1: Mean and standard deviation of students' reading comprehension scores (pretest and posttest)

Group	N	Pretest Mean	Posttest Mean	Mean Gain	Std. Dev.
Experimental Group	100	42.5	78.6	36.1	4.8
Control Group	100	43.0	60.2	17.2	5.6

The results show that students in the Human–AI collaborative group performed significantly better after the intervention than those taught with traditional methods. The mean gain for the AI-assisted group (36.1) was more than double that of the control group (17.2). This improvement suggests that combining teacher guidance with AI tools made reading lessons more interactive and engaging. Students were able to ask the AI Chabot questions, get instant feedback, and discuss confusing parts with their teacher and peers. This made learning more personal and exciting a change from the passive note-taking common in traditional classrooms.

Research question two: How does AI-supported instruction influence students' engagement and interest during reading comprehension lessons?

Table 2: Mean and standard deviation of students' engagement and interest scores (pretest and post-test)

Group	N	Pretest Mean	Posttest Mean	Mean Gain	Std. Dev.
Experimental Group	100	40.8	82.3	41.5	5.1
Control Group	100	41.5	58.7	17.2	5.4

Table 2 reveals a clear difference in students' engagement and interest after exposure to Human–AI collaboration. The experimental group recorded a significant mean gain of 41.5, compared to the 17.2 gain in the control group. This indicates that AI-supported instruction made students more attentive, curious, and participative during reading lessons. Students reported feeling motivated by the interactive nature of AI chatbots, which allowed instant responses and personalized reading activities. Unlike the traditional group that depended solely on teacher explanations, the AI-assisted learner's experienced active participation and immediate feedback, keeping them consistently involved in the lesson. In simple terms, the use of AI created a more stimulating and engaging learning atmosphere, confirming that human AI synergy increases students' interest and engagement in reading comprehension activities.

Research question three: How does the interaction between teachers and AI tools improve instructional delivery and learner performance in reading comprehension?

Table 3: Mean and standard deviation of teacher AI interaction and instructional effectiveness scores

Group	N	Pretest Mean	Posttest Mean	Mean Gain	Std. Dev.
Experimental Group	100	45.2	84.5	39.3	4.9
Control Group	100	44.6	63.1	18.5	5.3

Table 3 shows that teachers who used AI tools alongside their instruction achieved higher levels of classroom interaction and learner performance. The mean gain of 39.3 for the Human–AI group demonstrates that the combination of teacher guidance and AI feedback significantly improved lesson delivery and comprehension outcomes. The AI system helped teachers manage classroom diversity by providing individualized reading support and immediate corrections, freeing the teacher to focus on explaining deeper meanings and guiding discussion. Students benefited from both the human touch of explanation and the precision of AI feedback, making the lesson more effective and inclusive. In simple terms, when teachers and AI tools worked together, students learned better and faster, and teachers delivered lessons with greater ease and impact. This confirms that teacher–AI collaboration strengthens instructional effectiveness and overall learning quality in reading comprehension.

Discussion of Findings

The study found that combining human teaching with Artificial Intelligence tools greatly improved students' reading comprehension in secondary schools within the Obudu education zone. Students taught through Human–AI collaboration scored higher, showed greater interest, and participated more actively than those taught through traditional methods. The results provided clear evidence that AI-supported instruction helps students understand texts better through interactive feedback and adaptive reading exercises. The findings of this study agrees with the findings of David, Nnaemeka, Akuneme, & Nwosu (2025) & King (2023) that AI instruction significantly enhance engagement and comprehension, its impact depends heavily on context the readiness of teachers, infrastructure availability, and cultural acceptance of technology in pedagogy. The findings are also in line with the findings that AI sustain learners' interest and develop deeper comprehension skills (Adewale & Musa, 2023; Santosa, Wijaya, & Rahman, 2023).

Conclusion

The study demonstrated that the integration of Human AI synergy in reading comprehension could serve as a transformative approach to improving students' engagement, motivation, and overall understanding of texts in secondary schools. Students who experienced AI-supported instruction were able to personalize their learning pace, receive instant feedback, and develop stronger comprehension strategies compared to those under traditional instruction.

Recommendations

1. Teachers should adopt AI-assisted tools such as chatbots, intelligent tutoring systems, and interactive reading platforms to complement classroom instruction.
2. The Ministry of Education should provide regular training for teachers to develop their digital literacy and competence in using AI tools effectively.
3. Schools should create enabling environments with adequate ICT infrastructure to support AI-driven learning. Curriculum developers should integrate AI-based reading comprehension modules to promote critical thinking and independent learning.

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