

The Role of AI in Advancing Reading Fluency Among ESL Learners for Sustainable Development

¹H. C. Oguamanam,

²Ngozi Anchor-Lee

Okoro, ³Ngozi Christiana

Nzeakor & ⁴Titus Ezeme

^{1,2&3}Department of English

Language and Literature,

Alvan Ikoku Federal University of
Education

⁴Federal College of Education,
Umuahia

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Abstract

It is a universal truth that reading fluency, that is reading with adequate understanding of the meaning of the text, rapidly and with minimal difficulties about outcomes is essential in an ever – growing world where communication is constantly on the increase as well as the desire to meet the set instructional objectives. Actually, in English as a Second Language (ESL) situation, even students in tertiary institutions lack appropriate reading skills and the outcome often becomes poor academic achievement that has marred the goals of educational system. Notwithstanding, findings from researches have elicited results as pathways to navigate through fluency in reading among learners in ESL environments. Therefore, in this discourse, the concepts of reading fluency, AI-driven tools and their implementation for advancing reading fluency development among students in ESL are x – rayed. It adopted the theory of constructivism by Vygotsky and Piaget (1978). This theory aligns itself with the main objective of this work which highlights context in relation to active participation of learners for personal learning experiences as cardinal points. The authors conclude that the learners, the teachers, the school and the policy makers all have their parts to play if reading fluency has to be achieved through AI applications.

Corresponding Author:

H. C. Oguamanam

Background to the Study

Language is a symbol of social interaction. In a bid to maintain peaceful co-existence, there must be purposeful exchange of code, data, information or message. Language is said to be made up of four skills. Reading is one out of the four language skills. Reading is a complex skill which enables the reader to get information, data or message not only from written words or printed texts, but also from pictures, signs, symbols involving perception or thoughts, word recognition, meaning and comprehension (Nzerem, Oguamanam&Okoro, 2025). The concept of reading has been taken for granted over the years as stress-free aspect of language study not until recent studies in psycho-linguistics revealed that reading is not only a complex task, but one that tasks the brain and requires a skill. (Tamunobeleva, 2016).

As an integral part of psycholinguistics, it transcends reading ordinary words. For instance, in learning to read as a beginner, the learner attempts the recognition of objects by associating such objects with their real names, recognition of initial sounds in words, signs and symbols and assigning meaning to printed materials. (Okoro, Akueshi&Okoroafor, 2014, Oyetunde 2013). Unlike reading to learn which demands rational thinking and value judgment in an attempt to give or provide meaningful interpretations to what is read. On the other hand, fluency refers to the speed and accuracy in speech production. It is a parameter for measuring the language ability and proficiency of a language user. Therefore, reading fluency can be referred to as “accurate reading at a minimal rate with appropriate prosodic features and deep understanding (Ur, 2012).

Therefore, by implication, a fluent reader is regarded as one who can make optimal use of the redundancy in a piece of text. Since the aim of reading is to interact with the writer, the reader therefore should have the capacity to decode the writer's assumptions and ideas about the subject matter under consideration.

Conceptual Clarifications

AI

AI simply means Artificial Intelligence. AI tools offer immediate support and assistance to learners to develop fluency in reading. The use of AI-powered tools could be seen as having the capacity and capability to promote autonomy, that is to say; encouraging learners to take responsibility of their reading achievements or success. Some AI tools have the propensity to generate discussion forums or foster peer-reading group activities. Examples: Google read & write, mind grasp, Microsoft reading coach, Edcafe AI, Homer etc. These AI-driven reading technologies are fashioned in such a manner that they can activate and optimize quizzes, language games and discussions to improve the learners' overall language ability. When reading is contextualized using AI – Powered devices, it provides opportunities for developing reading fluency, induces a simulation of real-life experience as well as making reading more pleasurable.

Reading Fluency

In this context, reading fluency is regarded as the ability to read a given text quickly with accuracy of expression, making necessary connections, decoding the meaning of words with proper understanding. If speed, accuracy and reading with appropriate tone and clarity of expression are absent, then there is no fluency. Fluent readers not only read with speed and accuracy, but focus on getting the real meaning of a text fast, rather than struggling with words individually. Fluency is required in reading because it is a component of comprehension. Therefore, fluency can also mean the continuity, the smoothness, rate and effort in speech production observed in a speaker or reader (Hudson, Mercer & Lane, 2000).

ESL

English as a Second Language (ESL) is a language terminology for users of the English language who had already acquired their first language (L1), and by implication studying English for academic purposes and other needs. For instance, Nigerian students study the English language as ESL.

Statement of the Problem

It is disheartening to observe that in English as a Second Language (ESL) environments or contexts such as Nigeria even students in tertiary institutions lack adequate reading skills and the consequence is poor academic achievement that has helped to mar the realization of the set instructional performance objectives and by extension the general goals of educational system. The task of developing reading fluency among ESL learners globally is gradually becoming a pervasive issue. Despite the utility for academic progress, career opportunities and social mobility, many ESL learners find it difficult and still struggle to achieve appropriate fluency in reading thereby hindering their ability to fully engage in professional and academic programmes. The constraints associated with the teacher-centered methods of teaching that does not encourage autonomy and construction of knowledge by learners themselves can exuberate this issue. Moreover, the increasing linguistic diversity of the ESL learners emanating from their diverse cultural and linguistic backgrounds, and learning styles further complicate the effective development of reading instructions.

Meanwhile, the innovative power of Artificial Intelligence (AI) technological devices especially when rightly and aptly incorporated seem to provide answers to some of these teething problems confronting reading as an integral part of literacy skill. Therefore, with reference to the utility of AI tools, AI devices can provide individualized adaptive responses and interactive reading instructions patterned to meet individual learner's needs. However, there are visible lacunas existing in the following areas:

1. Limited awareness and understanding of AI's effectiveness. Indeed, there is an urgent need to investigate the place of AI – powered tools on ESL learners reading fluency development.
2. Insufficient design guidelines and challenges confronting implementation require attention to ensure that AI- tools meet the diverse needs of ESL learners.

Purpose of the Study

The main purpose of the study is to ascertain the roles of AI in advancing reading fluency among ESL learners in Lower Basic Schools in Orlu Local Government Area for sustainable development.

Specifically, the study seeks to:

1. Identify the AI – driven reading technologies that help in advancing reading fluency among ESL learners in Lower Basic Schools.
2. Find out the roles of AI tools in advancing reading fluency among ESL learners in Lower Basic Schools in Orlu LGA.
3. Find out the challenges facing AI in advancing reading fluency among ESL learners
4. Provide useful insights into effective instructional strategies and practices that can lead to reading fluency among ESL learners in Lower Basic Schools in the study area.

Research Questions

The following research questions guided the study

1. What is the AI-driven reading technologies that can enhance the advancement of reading fluency among ESL learners in Lower Basic Schools?
2. What are roles of the identified AI tools in advancing reading fluency among ESL learners in Lower Basic Schools in Orlu LGA?
3. What are the challenges hindering AI in advancing reading fluency among ESL learners in Lower Basic Schools?
4. What are the effective instructional strategies and practices that can lead to reading fluency among ESL learners in Lower Basic Schools in Orlu LGA?

Theoretical Framework

The preposition of this work is hinged on the constructivists' theory. The theory of constructivism was developed by Lev Vygotsky and Jean Piaget (1978). They advocate that learners through active engagement or participation construct knowledge by themselves when given adequate opportunity to try and try again. These proponents of constructivism incorporated activities, social interactions and context-based learning as principle actors in learning situations to enhance not only cognitive, affective or psychomotor domains, but to achieve interpersonal relationship as learners collaborate while actively engaged. They are of the view that learners should not be spoon-fed thereby highlighting social interaction as a bond-maker because when they mainstream, think-pair and share ideas together, it engenders team spirit.

Obviously, when learners, are divided into small groups and specific tasks are assigned discreetly, you will observe that actually learning is tied to specific contexts and a product of its environment. In line with the constructivist's theory or view, AI – tools can offer learners with personal experiences according to individual needs and learning styles in ESL environments. The integration of Artificial Intelligence in language learning has

become one of the defining trends of the 21st century classroom. Recent studies indicate that AI-powered tools are increasingly being used to address persistent challenges in ESL reading fluency, particularly in contexts marked by resource constraints and learning poverty (World Bank, 2023; UNESCO, 2024).

Several empirical studies have demonstrated the impact of AI on specific fluency components. Chen, Xie, and Hwang (2023) found that AI-based personalized reading applications significantly improved ESL learners' oral reading speed, accuracy, and comprehension through adaptive feedback. Similarly, Wang and Smith (2025) reported that Automated Speech Recognition (ASR) systems provide immediate pronunciation correction and prosodic feedback, which are critical for developing fluent reading among second language learners. A meta-analysis by Li and Hegelheimer (2024) further confirmed that ASR tools have a moderate-to-large effect size on ESL pronunciation and fluency outcomes.

Beyond technical skill development, generative AI tools such as ChatGPT are reshaping how ESL learners engage with texts. Dizon (2022) and Kohnke, Moorhouse, and Zou (2023) argue that ChatGPT can function as a 24/7 reading companion, offering simplified explanations, vocabulary support, and comprehension questions tailored to learner proficiency. Godwin-Jones (2023) adds that AI chatbots and virtual tutors reduce learner anxiety and increase practice time outside the classroom, which is essential for fluency development.

From a policy and development perspective, international organizations have positioned AI as a key enabler for achieving Sustainable Development Goal 4: Quality Education. The OECD (2023) and UNESCO (2024) both highlight AI's potential to promote equity in multilingual classrooms by providing personalized instruction at scale, especially for learners in low-resource settings. The World Bank (2023) specifically recommends leveraging EdTech and AI to address foundational literacy gaps and learning poverty in developing countries. In the Nigerian context, the conversation is just beginning. Olatunji, Bello, and Chukwu (2024) observed that 78% of Nigerian undergraduates already use AI tools for academic writing, but teacher-digital competence remains low at 35% (TETFund & NUC, 2024). This creates both an opportunity and an imperative: while students are adopting AI informally, Language Arts education must intentionally train learners and teachers to use AI ethically to advance reading fluency rather than replace foundational reading skills. In summary, current literature suggests that AI has significant potential to advance ESL reading fluency through personalization, immediate feedback, and increased practice opportunities. However, realizing this potential for sustainable development requires addressing teacher- capacity, ethical use, and equitable access to technology (Kukulska-Hulme & Lee, 2024; Zawacki-Richter et al,2023).

Method

The study examined the roles of AI in advancing reading fluency among ESL learners in Lower Basic Schools in Orlu LGA of Imo State. Four specific purposes and four corresponding research questions were formulated for the study. The study was hinged on the constructivist theory developed by Vygotsky and Jean Piaget. These proponents were of the view that learners should not be spoon-fed rather through active engagement and participation should construct knowledge by themselves when given adequate opportunity to try and try again. The study adopted the descriptive survey design and the population for the study was 1500 teachers drawn from 30 Basic Schools in Orlu LGA of Imo State. Ten percent (10%) of the population (150) was drawn to form the sample size. The purposive sampling technique was employed to draw five teachers as subjects from each of the thirty-sample public Basic Schools in the study area. Instrument for data collection was a researcher-made questionnaire titled "Role of AI in Advancing Reading fluency questionnaire" (RAIARFQ). The instrument was validated by two experts in Measurement and Evaluation of AlvanIkoku Federal University of Education, Owerri and the instrument was found to be reliable for use through the Cronbach alpha reliability method. The reliability index was 0.81. The direct method was adopted by the researchers for distribution of the subjects. This was to ensure a hundred percent return rate. The descriptive statistics of mean and standard deviation were the statistical tools used to answer the research questions.

Results

Research Question One: What are the AI-driven reading technologies that can enhance the advancement of reading fluency among ESL learners in Lower Basic Schools in OrluLGA.

Table 1: Mean and Standard Deviation responses on the AI-driven reading technologies among ESL learners.

S/N	ITEM	NO	SA	A	D	SD	X	SD	DECISION
1	Google read and write is one of the AI driven reading technology now in use	150	54	68	22	6	3.07	0.88	S.A
2	Mind grasp is another important AI tool that enhance, the advancement of reading fluency in our school	150	49	62	27	12	2.97	0.98	A.G
3	Microsoft reading coach is another AI tool that cannot be easily forgotten when listing AI tools.	150	61	75	9	5	3.28	0.72	S.A
4	Edcafe AI and Homer are worthy of mention when talking about AI-powered devices	150	53	66	24	7	3.10	0.99	S.A
	Cluster Mean						3.11	0.78	S.A

Table 1 above shows mean scores on items 1 to 4, items 1 to 4 have mean scores 3.07, 2.97, 3.28 and 3.0 respectively with their corresponding standard deviations 0.88, 0.98, 0.72 and

0.99. All the above mean scores and the cluster mean of 3.11 indicate strong acceptance to the item statements made in respect of research question one. To conclude therefore, the respondents strongly agree that google read and write, mind grasp Microsoft reading coach among the AI-driven reading technologies presently in use of basic schools in the study area.

Research Question Two: What are the roles of AI tools in advancing reading fluency among ESL learners in Lower Basic Schools in Orlu LGA?

Table 2: Mean and standard deviation responses on the roles of AI tools in advancing reading fluency among ESL learners.

S/N	ITEM	NO	SA	A	D	SD	X	SD	DECISION
1	AI driven reading technologies can be fashioned to activate and optimize quizzes, language games and discussions to improve the learners overall language ability	150	76	61	9	4	3.39	0.63	S.A
2	AI-powered tools could be seen to having the capacity and capability to promoting autonomy by encouraging learners to take responsibility of their reading achievements or success	150	72	73	4	1	3.44	0.54	S.A
3	Some AI tools have the propensity to generate discussion forums or foster peer-reading group activities	150	66	67	5	2	3.18	0.78	S.A
4	When reading is contextualized using AI-powered devices, it provides opportunities for developing reading fluency, induces a simulation of real-life experience as well as making reading more pleasurable	150	78	69	2	1	3.49	0.50	S.A
	Cluster Mean						3.38	0.61	S.A

Table 2 shows that items 5 – 8 have mean scores 3.39, 3.44, 3.18 and 3.49 and their corresponding standard deviations 0.63, 0.54, 0.78 and 0.50. Their cluster mean score of 3.38 clearly indicates strong agreement. To conclude therefore, respondents strongly agreed to all the item statements on the roles of AI tools in advancing reading fluency among ESL learners in Lower Basic Schools.

Research Question Three: What are the challenges hindering AI in advancing reading fluency among ESL learners in Lower Basic Schools in Orlu LGA?

Table 3: Mean and standard Deviation responses on the challenges hindering AI in advancing AI in advancing reading fluencing among ESL learners.

S/N	ITEM	NO	SA	A	D	SD	X	SD	DECISION
1	There is limited awareness and understanding of AI's effectiveness by stakeholders	150	54	62	22	12	3.05	0.75	S.A
2	The place of AI-powered tools on ESL learners reading fluency development has not yet been fully investigated	150	51	59	27	13	2.99	1.04	S.A
3	There is insufficient design guidelines and challenges confronting implementation	150	55	63	25	7	3.11	0.89	S.A
4	Uptill the research moment many ESL learners still take for granted reading as stressfree aspect of language study	150	49	58	29	14	2.95	1.20	S.A
	Cluster Mean						3.03	0.87	S.A

Table 3 shows that items 9 – 12 have mean scores 3.05, 2.99, 3.11 and 2.95 respectively and their corresponding standard deviation 0.75, 1.04, 0.89 and 1.20 all indicating acceptance. The cluster mean of 3.03 clearly indicates that respondents agreed to all the item statements in research question three as being challenges hindering AI in advancing reading fluency among ESL learners in Lower Basic Schools in the study area.

Research Question Four: What are the effective instructional strategies and practices that can lead to reading fluency among ESL learners in Lower Basic Schools in Orlu LGA?

Table 4: Mean and Standard Deviation responses on the effective instructional strategies and practices that can lead to reading fluency among ESL learners.

S/N	ITEM	NO	SA	A	D	SD	X	SD	DECISION
1	In learning to read as a beginner the learner attempts the recognition of objects by associating such objects with their real names, recognition of initial sounds in words, signs and symbols and assign meaning to printed materials	150	56	60	20	14	3.05	0.85	S.A
2	When learning to read has been achieved, ESL learners should move for reading fluency which involves the speed and accuracy in speech production	150	59	65	18	8	3.17	0.80	S.A
3	AI-driven reading technologies should be fashioned in such a manner to activate and optimize quizzes, language games and discussions to improve the learners' overall language ability	150	67	72	7	4	3.35	0.58	S.A
4	There should be sufficient design guidelines and attention required to ensure that AI-tools meet the diverse needs of ESL learners	150	50	54	29	17	2.91	0.98	S.A
	Cluster Mean						3.12	0.83	

Table 4 shows mean scores of items 13 – 16 as 3.05, 3.17, 3.35 and 2.91 respectively all being greater than the criterion mean. The cluster mean of 3.15 is a good indication that respondents agreed that all the item statements in respect of research question four.

Discussion

The above findings are henceforth discussed with respect to the research questions that guided the study that.

Research Question One: Concerning the AI-driven reading technologies/respondents in their numbers agreed that google read and write, mind grasp, Microsoft reading coach and Edcafe AI as well as Homer are some of the AI-driven reading technologies that can enhance the advancement of reading fluency among ESL learners in Lower Basic Schools in Orlu Local Government Area of Imo State.

Concerning the roles of AI tools in advancing reading fluency among ESL learners in Lower Basic Schools, respondents strongly agreed that AI-powered tools could be seen to having the capacity and capability to promoting autonomy by encouraging learners to take responsibility of their reading achievements or success by themselves. Also, some AI tools have the propensity to generate discussion forums or foster peer-reading group

activities. On the challenges hindering AI in advancing reading fluency among ESL learners as presented in research question three, respondents in their majority agreed that there is for now limited awareness and poor understanding of AI's effectiveness by stakeholders in the basic schools in Orlu LGA. There is also insufficient design guidelines and challenges confronting implementation; many ESL learners still take for granted reading as stress-free aspect of language study. Lastly, concerning research question four, the effective instructional strategies and practices that can lead to reading fluency among ESL learners include sufficient design guidelines and proper attention to ensure that AI-tools meet the diverse needs of ESL learners. Furthermore, when learning to read has been achieved, ESL learners should move for reading fluency which involves the speed and accuracy in speech production.

Conclusion

Findings of this study has shown that google read and write, mind grasp, Microsoft reading coach, Edcafe AI and Homer are some of the AI-driven technologies that can enhance the advancement of reading fluency among ESL Learners in Lower Basic Schools in Orlu LGA of Imo State. Moreover, efforts were made to identify the roles of AI tools in advancing reading fluency among ESL learners, as well as finding out the challenges hindering AI in advancing reading fluency in schools. Lastly certain effective instructional strategies and practices were investigated and ex-rayed to include sufficient design guidelines, fashioning AI-driven reading technologies to activate and optimize quizzes, language games and discussions to improve the learner's overall language ability among others. When all the above processes and findings were followed and implemented, ESL learners would gain more insight in the effectiveness of AI in advancing reading fluency in our Lower Basic Schools.

Recommendations

The following recommendations were proffered:

1. For reading fluency to be achieved through AI applications, all stake holders – the learners, teachers, the school and policy makers should try to play their different roles.
2. Efforts should be made to disabuse the concept of reading as a stress-free aspect of language study and implant the idea that reading is not only a complex task, but one that tasks the brain and requires a skill.
3. The reader should have the capacity to decode the writer's assumptions and ideas about the subject matter under consideration. In other words, learners should learn to read with comprehension.

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