International Journal of Spectrum Research in Social and Management Sciences (IJSRSMS)
1(4), October-December, 2025, Pages 148-159
© Noble City Publishers ISSN: 3092-9547

https://doi.org/10.5281/zenodo.17689447

The Impact of AI-Driven Chatbots on English Language Communication: A Comparative Analysis of Human - AI Interactions

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ABSTRACT

This study investigates the impact of AI-driven chat-bots on English language communication, focusing on a comparative analysis of human-AI interactions within secondary education in the Abuja Municipal Area Council (AMAC), Nigeria. Utilizing a case study methodology, data were collected from one hundred respondents, comprising both students and academic staff, and analysed using the Chi-square (X^2) statistical tool. The findings reveal that AI-driven chat-bots are vital tools for enhancing the processes of teaching, learning, and interaction in the English language, and are established as an economically viable method. The research identifies a transformational shift in educational communication through the use of AI to mimic human-like tasks and relationships. As this technology has been successfully adopted in other climes, the study strongly advocates for its integration into the Nigerian educational system, concluding that its significant merits outweigh potential demerits. The researcher recommends a collaborative effort among all stakeholders and the proactive integration of AI tools into the national curriculum. This measure is crucial to align with global educational trends and to build a resilient system capable of withstanding future disruptions, such as those experienced during the COVID-19 pandemic.

Keywords: Chatbots, secondary, AI, English language, education, Chi-square (X^2), teaching, learning

INTRODUCTION

Technology is recognized as a potential tool to innovate and change the dynamics of teaching and learning practices. Specifically, the recent technological advancements in artificial intelligence (AI) have caused AI to make its way into education. Learners and teachers widely utilize AI for several educational purposes by incorporating various tools and applications such as intelligent tutoring systems, teaching robots, social interactions and adaptive learning systems (Chen et al., 2020). Among these, AI-powered chatbots have attracted noticeable interest for their potential to promote language learning and interactions. An AI-powered chatbot is a computer program that can engage in conversations through audio and text interfaces (Kim et al., 2021). Significant advancements in AI promoted the use of chatbots in language education (Jeon, 2022). Incorporating AI-powered chatbots for educational purposes allows learners to practice a foreign language (Kim et al., 2021). Interacting with these chatbots also provides plenty of opportunities for speaking practice (Kim et al., 2021). Moreover, AI-powered chatbots could engage in intelligent dialogues with language learners while evaluating their speaking skills (Huang et al., 2023). Thus, AI-powered chatbots can provide personalized learning experiences and accommodate students' individual needs and proficiency levels.

AI-powered chatbots have become increasingly popular in English language teaching over the past few years (Kim et al., 2019). Additionally, chatbots developed for commercial use have increased significantly in recent years. Therefore, studies on AI-powered tools and their effects on language skills are gaining importance, which also shows that researchers have growing interest in using AI tools in language education (Huang et al., 2023). Several systematic reviews have investigated the efficacy of chatbots and AI-powered chatbots, summarizing their application in language education overall (Huang et al., 2021; Kuhail et al., 2023; Pérez et al., 2020; Wollny et al., 2021). However, a notable gap exists in the literature regarding systematic

reviews specifically addressing the use of AI-powered chatbots for English as a foreign language (EFL) learners' and for interactions processes.

Artificially Intelligent Chatbots: Various AI tools have been used in education to facilitate language learning and interaction. Nowadays, within the diverse AI applications in language education, chatbots have become prominent for their ability to mimic human speech and provide interactive language practice. Most chatbots employ AI algorithms and Natural Language Processing (NLP) techniques to generate responses, providing users with a conversational experience that closely mimics human interaction (Hsu et al., 2023). They have a sophisticated conversational system designed to mimic human interaction through written or spoken language, and these systems can communicate through text, speech, visuals, virtual gestures, or physical gestures with feedback (Belda-Medina & Calvo-Ferrer, 2022).

The history of Chatbots dates back to the early 1960s with the development of ELIZA, a program that interacted with human users through typed English input (Kim et al., 2019). Since then, chatbots have evolved from retrieval-based systems to more advanced generative models. ALICE, Cleverbot, Elbot, Eve, Replika, Lyra, Andy, Mondly, and Duolingo are Chatbots invented after ELIZA. Although numerous chatbot applications share similarities, some stand out for their effectiveness in promoting and motivating users to learn, engage in conversation, and communicate effectively (Kim et al., 2019). They can provide students with increased interactivity and expanded opportunities to utilize foreign languages despite the limitations in language learning (Kim et al., 2019).

Some Chatbots are specifically designed for foreign language learning, such as CLIVE, an early AI-powered Chatbots. CLIVE is an AI-powered Chatbots that can provide users with authentic conversations by utilizing an instant messaging interface to facilitate conversational language practice (Zakos & Capper, 2008). Several AI mobile applications have been created for EFL speaking practice, including Duolingo, Liulishuo, and EAP Talk, all utilizing speech evaluation technology and NLP (Zou et al., 2023). Advanced AI models such as ChatGPT contributed to the popularity and use of chatbots. The emergence of new applications like Talk-to-ChatGPT has provided significant growth in conversations between humans and chatbots (Jeon et al., 2023). Moreover, ChatGPT 4.0 offers users a human-like communication experience by providing text- and voice-based interaction. These advancements have led AI technology to have a significant role as a conversational tool in language education. In their systematic review, Ji et al. (2022) stated that the primary function of conversational AI was to serve as a speaking partner. Most of the studies they reviewed utilized conversational AI as a speaking partner that uses learners' spoken input for interaction. Similarly, Jeon et al. (2023) reviewed studies on speech recognition chatbots for language learning and found that conversational partner was the most common role of chatbots.

Thus, the potential of AI-powered chatbots to improve EFL speaking skills as effective conversational partners has been the focus of research. However, understanding how these tools specifically impact interaction processes is essential. Artificial intelligence implies creating the computers or machines as intelligence as human being. According to father of artificial intelligence, John McCarthy (2023), artificial intelligence is a way of making a computer, a computer controlled robot or a software think intelligently. A major thrust of artificial intelligence is in the development of computer functions associated with human intelligence such as reasoning, learning and problem solving.

However, human behavior is influenced by internal mental processes. Our thought processes determines or modify how we behave in several ways. The thought processes of an individual determine how privately he views a situation or an event and therefore how he acts towards the situation or an event. Internal mental processes of an individual explain the person attitude towards an institution, a group of people and the values system he has developed. Human cognitive plays a critical role in learning and therefore it determine how we plan a course of an action and implement it, solve problems , make decisions, form concepts, review our value system, beliefs and attitude.

Statement of the Problem

This study focuses on the impact of AI driven Chatbots on English language communication: comparative analysis of Human AI interaction. To ensure and assure efficiency and effectiveness in delivery services and achieve a success, what is trending technologically to achieve a success is apply to all fields, students learning, communication inclusive. This is the reason, the researcher theme of study was "Impact of AI Driven Chatbots on English Language Communication: Comparative Analysis of Human AI interaction.: A Case Study of some selected Senior Secondary Schools in Abuja Municipal Area Council (AMAC), Federal Capital Territory, Nigeria."

If artificial intelligence is traceable to the success of any field, then, it is important to examine the variables "AI Chatbots impact and Human AI Interaction". In the course of study, other issues associated with the variables shall be discussed, issues such as goal of artificial intelligence chatbots, types of artificial intelligence chatbots, comparison of the two variables, strategies, , relationship between the two variables, emotions of communicators, role in positive delivery etc. However, the following problems are being examined:

1. What is artificial intelligence chatbots?
2. What are the effects of artificial intelligence chatbots to human intelligence?
3. To examined the relationship between artificial intelligence chatbots and human cognitive reasoning's?
4. The theories associated with chatbots communications tools and its impacts in interaction processes.
5. To examine the various types of artificial intelligence chatbots
6. The strategies to integrate this into learning and communication so as assure proficiency in communication interaction
7. To affirm the hypothesis tested to determines whether artificial intelligence chatbots have superior influence over human intelligence

Purpose of the Study

The purpose of this study is as follows:

1. To describe the implications of artificial intelligence chatbots and human cognitive ability to the process of communication processes and interaction with application to selected senior secondary students.
2. To establish the importance of artificial intelligence chatbots and human intelligence to the students learning and communication processes
3. To x-ray the relationship between artificial intelligence chatbots and human intelligence.
4. To state categorically whether artificial intelligence have superior influence over human intelligence in the process of interaction.
5. To examine the strategies to integrate artificial intelligence chatbots to complement the human intelligence so as to ensure proficiency in learning and interaction processes. in Nigeria.

Research Questions

The following research questions are being asked with the regards to artificial intelligence chatbots and human intelligence in communication and learning processes:

1. Does artificial intelligence chatbots affect students' academic performance positively or negatively?
2. Can artificial intelligence chatbots perform the functions of human intelligence independently in interaction processes?
3. How true is it that artificial intelligence chatbots is the best form of imparting as it is been practiced in some other cline?

4. Are there relationship between artificial intelligence chatbots and human cognitive to achieve free flow of interaction and ensure instant feedback?
5. If what is trending technologically is good for interaction, how do we integrate this into education sectors and other field to ensure success?
6. What strategies can we adopt to ensure success of the integration into the system?

Scope of the Study

The basis of this study is to explore the "Impact of AI Driven Chatbots on English Language Communication: Comparative Analysis of Human AI interaction.: A Case Study of some selected Senior Secondary Schools in Abuja Municipal Area Council (AMAC), Federal Capital Territory, Nigeria."

The researcher shall also look into other factors associated with the subject matter, that is, the artificial intelligence chatbots, the cognitive ability of human; the study shall premise its findings from the case study through some selected Senior Secondary Schools Students in Abuja Municipal Area Council (AMAC), Federal Capital Territory, Nigeria.

Significance of the Study

The study revealed the contributions of artificial intelligence chatbots to the learning and interaction processes with relations to the innate cognitive ability of the humans to solve problems, make decision and reason fast, ensure instant feedback to the communicators, ensure proficiency. It will establish the ""Impact of AI Driven Chatbots on English Language Communication: Comparative Analysis of Human AI interaction.: A Case Study of some selected Senior Secondary Schools in Abuja Municipal Area Council (AMAC), Federal Capital Territory, Nigeria". However, the study has serious major positive implications to the interaction processes to compliment the efforts of human intelligence especially to the learners.

Research Hypothesis

1. Ho- Artificial intelligence chatbots and human artificial intelligence are not vital tools for enhancing teaching, learning and interaction processes in English language.
   Hi- Artificial intelligence chatbots and human artificial intelligence are vital tools for enhancing teaching, learning and interaction processes in English language.
2. Ho- Robotics learning and interaction processes are not economical and sustaining considering our peculiarities as a nation.
   Hi- Robotics learning and interaction processes are economical and sustaining considering our peculiarities as a nation.

RESEARCH METHOD

Research Design

The design of the study is a survey research design. A survey research is one which involves the assessment of public opinion using questionnaire and sampling method. When carrying a survey research, the researcher collected detailed descriptions of existing phenomenon with the intent of using the data to justify current conditions and practice or make better plans for improving phenomenon (Emmah, 2010:34). As a survey design, this study look into the "Impact of AI Driven Chatbots on English Language Communication: Comparative Analysis of Human AI interaction.: A Case Study of some selected Senior Secondary Schools in Abuja Municipal Area Council (AMAC), Federal Capital Territory, Nigeria."

Area of the Study

The areas of this study are senior Secondary School Karu, Senior Secondary School Jikwoyi, senior Secondary School Kurudu, senior Secondary School, Orozo and Senior Secondary School Karshi. They would be examined mainly on variables of artificial intelligence chatbots problems and prospects in the interaction processes and Human artificial intelligence variables.

Population of the Study

The population of this study comprises 3633 students and teachers in senior secondary schools in Abuja Municipal Area Council. A population in research is a target group which a researcher is interested in studying a particular trait or issue which he/she intends to obtain information and draw conclusion. The target population of the study is made up of some selected secondary schools in Abuja Municipal Area Council. The target population would compare members who have some common characteristics which are specified e.g. age, sex, and environment. The target population of this study, that is, the selected secondary schools and their population are as follows:

Table 2.1: Number of students and teachers selected in the secondary schools in Abuja Municipal Area Council.

S/NO	**Names of Schools**	**Number of Population**
1	**SSS Garki**	700
2	**S.S.S Jikwoyi**	1000
3	**S.S.S Kurudu**	602
4	**S.S.S Orozo**	863
5	**S.S.S Karshi**	732
	Total	**3633**

Source; Selected Senior Secondary Schools in Abuja Municipal Area Council**.**

Sample and Sampling Techniques

For the analysis of data collected, a simple percentage was used

% =2 $\frac{A}{B}$ X $\frac{100}{1}$

Where A = individual available

B = sum total available

Instrument for Data Collection

In order to obtain relevant data from the sampled subjects (Teachers and students). The researcher used questionnaire and observation methods to get the responses and results respectively from the respondents. The questionnaire was published to obtain information with respect to "Impact of AI Driven Chatbots on English Language Communication: Comparative Analysis of Human AI interaction."

Validation of Instrument

To ensure the validity of the instrument used; the respondents were cross examined on the answers they gave. Moreover, few copies of the questionnaires were distributed to other teachers outside the study group. Their contributions were valuable in assessing the validation of the data obtained from the study group which was added to the researcher's personal observation and interaction with some students among and outside the study group.

Pilot Study and Reliability of the instrument

In a nutshell, reliability has to do with the consistency of independent measurement of the same phenomenon. In relation to the aforementioned, the researcher has found the instrument used (questionnaire) in the course of this research work very reliable.

Method of Data Collection

The instrument of this study is questionnaire and participant observation of students and teachers. The questionnaire contains questions in which the respondents are restricted to some response. The rating scale was based on rating scale of YES or NO. This helped the researcher to know the reliability of the question. This kind of instrument is like a scale instrument. It is mostly used for data collection.

Method of Data Analysis

The method of data analysis employed in this research work is the simple percentage from the data presented. This is calculated with the use of chi-square to test the hypothesis stated in the chapter one
The researchers opt for this method because the data are in frequency(s). The following formula is used in computing the chi-square value for the data:

$$X^2 = \varepsilon \frac{(fo - fe).^2}{fe}$$

Where X^2 = Chi-square
fo = Observed frequency
fe = Expected frequency
Fe is calculated thus:

$$\frac{\text{Row Toatal } \mathbf{X} \text{ Column Total}}{\text{Ground Total}}$$

Data presentation and analysis

In order to analyze the data gathered for the subject matter ""Impact of AI Driven Chatbots on English Language Communication: Comparative Analysis of Human AI interaction."A Case Study of some selected Senior Secondary Schools in Abuja Municipal Area Council (AMAC), Federal Capital Territory, Nigeria, the data obtained were used to check the formulated hypothesis. The questionnaires were administered to the senior and junior secondary schools teachers. Also, the learners or students were observed and tested to enable the researcher compare the variables on students learning.

Table 3.1: Shows the Percentage of Questionnaires Returned and Used for the Analysis.

S/N	Sample of questionnaire	Total number of questionnaire	Number returned	Number not returned	Percentage
1	Teacher's questionnaire	50	36	14	50%
2	Student's questionnaire	50	44	6	50%
	Total	**100**	**80**	**20**	**100%**

Source: Field survey, September 2025.

Hypothesis one

1. Ho- Artificial intelligence chatbots and human artificial intelligence are not vital tools for enhancing teaching, learning and interaction processes in English language.
   Hi- Artificial intelligence chatbots and human artificial intelligence are vital tools for enhancing teaching, learning and interaction processes in English language.

Necessary findings shall be deduced from this at the end of the analysis. Chi-square statistical tool shall be used.

$x^2 = \frac{(\text{Fo}-\text{Fe}}{\text{Fe}}$ Where:

Fo = Observed frequency

Fe = Expected frequency

X^2 = Chi-square

$$Fe = \frac{\text{Row Total X Column Total}}{\text{Grand Total}}$$

OBSERVED FREQUENCY (Fo)

Options	Table 4.2 Response	Table 4.4 Response	Total
Yes	49	59	108
No	31	21	52
Total	**80**	**80**	**160**

EXPECTED FREQUENCY (Fe) CONTINGENCY TABLE

Table 4.2	Table 4.4
$Fe = \frac{80\ X\ 108}{160} = 54$	$Fe = \frac{80\ X\ 108}{160} = 54$
$Fe = \frac{80\ X\ 52}{160} = 26$	$Fe = \frac{80\ X\ 52}{160} = 26$

CHI-SQUARE TABLE

S/N	Observed Freq (Fo)	Expected Freq (Fe)	O-E	$(O-E)^2$	$\frac{O-E}{fe}$
1	49	54	-5	25	0.4630
2	31	26	5	25	0.9615
3	59	54	5	25	0.4630
4	21	26	-5	25	0.9615
Total				**X^2=2.8490**	

Calculated $X^2 = 2.8490$

The degree of freedom is calculated thus:

DF = (r-1) (c-1)
DF = (2-1) (2-1)
DF = (1) (1)
DF = 1

The preferred level of significance for the chi-square is @ 0.05. Therefore X^2 @ 0.05 significance level @ 1 = 0.0039

Decision

Since the table value of 0.00393 is less than the calculated value of the chi-square 2.8490, we reject the null hypothesis and accept the alternative hypothesis that stated thus "artificial intelligence chatbots and human artificial intelligence are vital tools for enhancing teaching, learning and interaction processes in English language.

Hypothesis Two

Ho- Robotics learning and interaction processes are not economical and sustaining considering

our peculiarities as a nation

Hi- Robotics learning and interaction processes are economical and sustaining considering

our peculiarities as a nation.

OBSERVED FREQUENCY (Fo)

Options	**Table 4.6 Response**	**Table 4.8 Response**	**Total**
Yes	73	18	91
No	7	62	69
Total	**80**	**80**	**160**

EXPECTED FREQUENCY (Fe)

Table 4.6	**Table 4.8**
Fe = $\frac{80\ X\ 91}{160}$ = 45.5 Fe = $\frac{80\ X\ 69}{160}$ = 34.5	Fe = $\frac{80\ X\ 91}{160}$ = 45.5 Fe = $\frac{80\ X\ 69}{160}$ = 34.5

CHI-SQUARE CONTINGENCY TABLE

S/N	Observed Freq (Fo)	Expected Freq (Fe)	O-E	$(O-E)^2$	$\frac{(O-E)2}{fe}$
1	73	45.5	27.5	756.25	16.6209
2	7	34.5	-27.5	756.25	21.9203
3	18	45.5	-27.5	756.25	16.6209
4	62	34.5	27.5	756.25	21.9203
Total			**X^2=77.0824**		

Calculated X^2 = 77.0824

The degree of freedom is calculated thus:

DF = (r-1) (c-1)

DF = (2-1) (2-1)

DF = (1) (1)

DF = 1

The preferred level of significance for the chi-square is at 0.05. Therefore X^2 at 0.05 significance at level 1 = 0.00393

Decision

Since the table value of 0.00393 is less than the calculated value of the chi-square 77.0824, we reject the null hypothesis and accept the alternative hypothesis that stated thus "robotics learning and interaction processes are economical and sustaining considering our peculiarities as a nation.

Summary

The research work focuses on the following three purposes. These include:

a. To establish prospects and problems of artificial intelligence chatbots and human artificial intelligence interaction processes.
b. To explore if there is any relationship between artificial intelligence chatbots, human artificial intelligence and interaction processes during teaching learning and communication
c. Also, to describe the problems, similarities associated with the two variables, if there is any necessary advice through the research findings.

It however suggested the followings:

a. Artificial intelligence chatbots should be encouraged for learning and teaching for all science students.
b. Parents should participate fully in the process to ensure control and proper usage of the tools, considering the fact that positive consequences outweigh the negative consequence.

c. Thirdly, training and retraining of staffs must be conducted and gaps should be bridge.
d. In other to meet world standard and to ensure control, there should be more sensitization and integration of the subject AI into Nigerian curriculum for proper understanding.
e. The stakeholders should ensure adequate sensitization on types of software, machines and tools to use so as to ensure positive consequences. From the findings it can be deduced that merits are more than demerits if properly monitored and supervised.

CONCLUSION

The findings of this study leads to a sort of conclusion as follows:

- This research work has provided a comprehensive overview of the benefits and challenges of AI-based chatbots in communication process.
- By integrating research from AI chatbots, positive psychology and language education, the work has highlighted the crucial role of emotions in shaping learners' experiences and outcomes in chatbot assisted language learning with reference to interaction processes in English language.
- The work has discussed the theoretical foundations underpinning the intersection of these two variables, emphasizing the need for a more holistic approach to understanding and optimizing chatbot-learner interactions.
- Furthermore, the research work has proposed strategies for addressing these challenges and optimizing chatbot-learner interactions, such as incorporating affective computing techniques and designing culturally-sensitive chatbots.
- Emanating situational factors such as types of tools to use, attitude of teachers and students to the tools, lack of facilities, environmental issues, ability to meet the global trend considering our peculiarities etc are germane to the usage of artificial intelligence chatbots and robotics learning and interaction.
- Artificial intelligence combining traditional teaching and learning other than robotics teaching exert more opportunities to the stakeholders; therefore necessary actions should be taking to actualize this as it is being practice in other cline.
- Federal ministry of Education, other training institutes concerned should initiate re-training of the stakeholders on the subject matter.
- That the consequence are positive, there is no need to be afraid. The tools are suppose to meant to complement traditional teaching. aid to learning. Moreover, we cannot do without human reasoning faculty. Machines need to be initiated by someone. Machines cannot move itself; therefore, combination of the two will make the study faster and interesting.

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