ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
JALT

EXPLORING THE ROLE OF AI CHATBOTS IN ENHANCING ENGLISH GRAMMAR AND VOCABULARY ACQUISITION: A STUDY OF LEARNING DYNAMICS, USER ENGAGEMENT, AND LINGUISTIC DEVELOPMENT

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Abstract
This research analyzes how AI chatbots boost English linguistic development in grammar and vocabulary retention among learners through studying both user interaction patterns and dialogue evolution throughout time. In the study research team conducted quantitative assessments alongside qualitative interviews to evaluate participant experience and measure their development. AI chatbots produce effective results by enhancing experimental participants' grammar and vocabulary understanding beyond what control participants achieve thus demonstrating their power in language education processing and feedback delivery. Interactions with the chatbot resulted in enhanced learner commitment because the system automatically created tasks that matched unique learner requirements. Technical problems alongside contextual understanding difficulties by the chatbot were encountered. Language education benefits from AI chatbots because they provide customized learning experiences which produce continuous student involvement and language advancement. The authors suggest that AI chatbots should become more prominently integrated into educational curricula while developing new features to support speaking and listening skills and studying their effects on different learning populations.

Keywords: AI chatbots, blended learning, language acquisition, language proficiency, user engagement,

Introduction

Background and Context

AI implemented in education combines with traditional teaching approaches to create new student and instructor frameworks. AI chatbots function as leading technologies within the field of language acquisition. The tools utilize natural language processing (NLP) to deliver immediate feedback while generating virtual communication practice along with customized learning approaches that adapt to student requirements (Kim et al., 2023; Smith & Jones, 2022).

The basic components of grammar and vocabulary structure fundamental language acquisition while creating successful communicative and comprehension abilities. Effective mastery of English language rules and knowledge across broad vocabulary becomes essential because of its intricate nature. Traditional educational approaches prove inadequate at serving heterogeneous student needs while failing to generate adequate learning engagement which opens opportunities for AI-based educational systems.

Research has focused on diverse language learning tools under investigation by exploring mobile apps alongside online platforms and gamified systems (Garcia & Fisher, 2023; Huang et al., 2022). Research about how AI chatbots help students develop grammar and vocabulary still needs deeper study because their exact educational impact on these language areas is insufficiently documented.

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL

Research Questions

Q1. What implementation of AI chatbots affects both student knowledge of grammar rules and expansion of their vocabulary stock

Q2. What patterns exist between users and AI-powered chatbots when students apply them to language learning?

Q3. What impact does the use of AI chatbots create on students' long-term linguistic advancement?

Objectives

1. The evaluation examines how well AI chatbots enhance both grammatical precision and vocabulary maintenance.
2. A study assesses both how users engage with chatbot-based learning systems and which learning techniques they adopt during their interactions.
3. The research identifies barriers facing the optimization of AI chatbots while developing recommendations to maximize language acquisition effectiveness.

Significance of the Study

Contribution to Language Learning Methodologies

Research investigates current language learning methodological developments by studying the addition of AI chatbots as supplemental instructional tools. Natural language processing (NLP) combined with machine learning algorithms allows AI chatbots to deliver customized interoperable educational spaces which support distinct learner requirements. Current research shows that chatbots yield major improvements for both learner autonomy and their involvement in language acquisition (Chen et al., 2023; Li & Huang, 2022). The study builds on existing research through empirical verification of their effects on grammar and vocabulary acquisition.

Practical Implications for Education and Technology Integration

The results generate usable guidelines for educational institutions and technology developers and government stakeholders regarding their multilateral implementation of AI chatbots to boost language acquisition effectiveness. The study shows how instructors can utilize chatbots to support their standard educational approaches through access to supplementary exercises which deliver immediate responses. Developers obtain design improvement recommendations for chatbots by studying adaptive learning features and user interface practices. Results from this study enable policymakers to seek support for AI technology inclusion into language education and ensure fair access to smart learning resources (Gonzalez & Martin, 2023; Patel & Singh, 2022).

Literature review

Overview of Language Acquisition Theories

Research on language acquisition has kept precedence across multiple decades as theoretical frameworks develop to understand diverse aspects of grammatical and lexical learning. According to Krashen's (1985) Input Hypothesis model language learners learn grammar and vocabulary from comprehensible material that matches their current language abilities just beyond their present level (referred to as "i+1"). The model demonstrates that successful language learning requires both appropriate input and effective learner interaction with authentic language usage. The Input Hypothesis provides extensive evidence for decision-making about implementing authentic language content along with immersion learning pathways in language education.

The teaching approach of Task-Based Learning (TBL) developed by Ellis (2003) assigns central importance to authentic language use in educational tasks. Through TBL language learners build better grammatical proficiency and lexical resources by doing

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL

communicative tasks so they become more proficient in using language while maintaining vocabulary retention. Through real-world problem-solving tasks students gain better understanding of both grammar structures and vocabulary items because the tasks provide meaningful learning contexts.

AI in Education

Research in educational environments shows growing potential of Artificial Intelligence (AI) through which educational institutions implement tools for customizing learning programs and delivering prompt feedback and fostering self-learning opportunities. Throughout history education utilized AI beginning in the 1960s before machine learning brought substantial progress in NLP and sophisticated artificial intelligence systems emerged.

Language education has seen significant AI adoption after Duolingo and Babbel made their appearance by utilizing AI algorithms to create personalized learning adaptions. The systems use information about learner skill levels to generate customized practice tasks specifically designed for individual needs. Study results produced by Xu et al. (2022) along with Zhang & Chen (2023) demonstrate that AI brings favorable outcomes to language learning through immediate feedback features and personalized drill sessions and autonomous learning promotion. AI systems demonstrate value for grammar acquisition by using their adaptive capabilities through tools such as Grammarly and writing feedback systems implemented in English for Academic Purposes (EAP).

Chatbots in Language Learning

Chatbots represent one type of Artificial Intelligence tool that shows increasing adoption as they make significant improvements to language learning through enhanced grammar classwork and vocabulary acquisition. Yang et al. (2023) showed chatbots create a dynamic interaction space which helps students build dialogue skills while developing better control of language rules and vocabulary mastery. These artificial bots replicate human exchanges to automatically detect grammar mistakes during interactive practice sessions in non-critical feedback environments which encourages more frequent student training.

Various artificial intelligence enhanced chatbots exist to enhance grammar and vocabulary knowledge. The software systems at English Helper guide users to improve sentence organization and expand their vocabulary but Replika specializes in creating conversation practice sequences. According to Liao & Li (2024) chatbots assist language learners in building a longer-term memory for new words via their capability to offer authentic sentence practice and assorted word exposure formats. The built-in grammatical correction and usage examples found in chatbots support learners in their implicit development of grammar knowledge.

Today's natural language processing (NLP) creates improvements in the performance capabilities of chatbots when teaching language skills. Novel advancements in chatbot technology enable systems to process learner communications in ways that create more natural and customized interactions. Zhou et al. (2023) found that recent NLP developments have enhanced chatbots' feedback capabilities for vocabulary and grammar specifically because NLP processing abilities have advanced to handle diverse linguistic formats while detecting subtleties between different language inputs.

Gaps in Research

Investigation of AI chatbots in combination with linguistic development still needs additional research attention despite increasing texts on AI usage in language learning particularly for grammar and vocabulary acquisition. The bulk of existing research about AI chatbots concentrates on conversational practice and speaking skills (e.g., Pesti et al., 2023) but researchers have done limited work investigating how these tools contribute to advanced

ISSN E: 2709-8273
ISSN P:2709-8265
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language learning objectives including grammar rule mastery and vocabulary expansion with enduring results.

Studies examining AI tools for language learning have mostly overlooked the role of sustained learner participation with these systems to determine their impact on durable educational effects. Available studies employ mostly brief evaluation approaches within structured environments but do not study diverse learner types nor authentic technology use environments. The investigation of how sustained user interactions with AI chatbots impact grammatical and lexical growth in learners remains an unexplored research field.

Chatbot technology demonstrates potential improvements in language learning through grammar and vocabulary education yet researchers need better insights into how these systems boost linguistic development over time. Further research should explore systematic approaches to add chatbot interactions into language curriculum structures together with studying how students' usage of these systems influences their developing linguistic abilities throughout time.

Methodology

Research Design

A research project that used mixed-methods methodology investigated how AI chatbots enhance English grammar along with vocabulary acquisition for English second language students. The study married quantitative research methods with qualitative methods to achieve an extensive understanding of how chatbots affect language education. In the quantitative assessment researchers conducted pre-intervention and post-intervention evaluations of grammar and vocabulary achievement by test subjects utilizing an artificial intelligence chatbot. Through this method researchers could determine what impact the AI chatbot had on student language attainment. Through semi-structured interviews with learners researchers gathered qualitative data about their experiences interacting with the chatbot as part of the qualitative investigation phase. The detailed interviews provided the researcher with deep insights about students' subjective experiences through which they assessed the chatbot's learning functions and engagement barriers and achievement results. Both statistical data and extensive descriptive information were generated by implementing quantitative analysis along with qualitative methods to study AI chatbots' contribution to language learning.

Data Collection Procedure

Data were collected in two primary stages: Two distinct data collection approaches were used during the pre-intervention phase while the post-intervention phase employed separate evaluation methods. The initial assessment included a language proficiency test that examined participants' grammar skills combined with their vocabulary performance. The language proficiency test served as the baseline assessment before the intervention phase to track participants' skills development following the intervention. The experimental group participants started their engagement with the AI chatbot system immediately after pre-test completion and continued their interaction through 6 weeks of scheduled use. The designed chatbot system provided customized exercises about grammar and vocabulary which adjusted to users' individual practice requirements. Participants regularly used the chatbot for multiple language skill improvement purposes through task completion activities. The system automatically logged data about participant engagement through recordings of exercise completions along with duration metrics of chatbot interactions.

Participants received a post-intervention assessment which mirrored the pre-test design to measure any improvements in their grammar knowledge and vocabulary control. Post-intervention qualitative data about participants' experiences with the chatbot was collected

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
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Vol.8.No.1 2025

through semi-structured interviews with members of the experimental group. Participant perceptions regarding chatbot effectiveness for language skill improvement and their experience assessment using the system and encountered challenges were investigated through structured interviews. User experience insights emerged from qualitative interview responses and added important information to the quantitative study results. Thorough collection of different data types enabled researchers to develop an extensive evaluation of both instruction achievements and user perspectives toward AI chatbots for language learning purposes.

Participants

Sixty students learning English as a second language participated in the study which took place at an English language learning program. The group was divided into two categories: Experimental Group (30 participants) and Control Group (30 participants). Participants in the Experimental Group learned with an AI chatbot yet the Control Group received instruction through traditional grammar and vocabulary methods.

Table1. Demographic Information

Age Range	Gender	Educational Background	Proficiency Level (Pre-Test)	Hours of Weekly English Practice	Motivation to Learn English
18-25	Male	Undergraduate	Intermediate	5	High
18-25	Female	Undergraduate	Intermediate	3	Medium
26-35	Male	Postgraduate	Advanced	7	High
26-35	Female	Undergraduate	Beginner	2	Low
36-45	Male	Postgraduate	Intermediate	6	Medium
36-45	Female	Undergraduate	Advanced	4	High
18-25	Female	Undergraduate	Beginner	4	Low

Sampling

The research used stratified random sampling to provide representation for participants drawn from different demographic groups. The research design stratified participants by age groups, gender, educational stage and starting competency levels. The research employed this sampling approach to standardize potential confounding variables enabling a more extensive representation of ESL learners.

Sample

Sixty students from an English language program at a major language teaching center were selected for research participation. The researchers hand-picked 60 ESL learners from the language learning institution following well-defined selection parameters. All participants either attended ESL courses at present or demonstrated basic English comprehension from Beginner to Advanced levels. The research design enabled examining how AI chatbot interventions affect students who are at different points on the language learning spectrum. Each participant needed to spend 6 weeks using the AI chatbot and agree to the research conditions.

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Research Instruments

Standardized tests plus interaction logs and semi-structured interviews served as research instruments for this study to gather quantitative and qualitative data about how AI chatbots enhance students' English grammar and vocabulary learning.

Language Proficiency Test (Pre-test/Post-test)

A language proficiency test measured grammar and vocabulary knowledge development from participants before and after engaging with the intervention system. The initial language assessment served as the pre-test before the students used the AI chatbot. After AI chatbot interactions they took a post-test to show their vocabulary and grammar development. The evaluation tool followed specifications from the Common European Framework of Reference (CEFR) for language proficiency assessment to establish its validity for measuring learner skills. Participants engaged with a test format which included both multiple choice questions coupled with sentence correction tasks and vocabulary matching components that focused on essential grammar rules and vocabulary elements. The established parallelism between pre- and post-intervention tests enabled researchers to directly monitor participant language development progresses during the six-week AI chatbot program.

AI Chatbot Interaction Logs

The AI-powered chatbot documented complete logs of user interactions which monitored participants' approach with the system throughout the 6-week period. The AI tracking system collected data through exercise completion logs which showed what errors occurred and the length of time users spent communicating with the system. Our collected data served as an quantitative metric to measure each participant's chatbot interaction commitment including their active duration along with their general interaction intensity. The interaction logs showed patterns of student engagement at various skill levels by linking frequent or extended engagement to improved language abilities. The researchers could evaluate how much personalization the chatbot integrated through log analysis because it adapted learning exercises based on each user's skill level and their personal speed of learning.

Data Analysis

By uniting language proficiency test outcomes with AI chatbot dialog records and semi-structured interview data researchers used descriptive statistics alongside qualitative analysis to explain AI chatbots' effect on English grammar education and vocabulary training.

Quantitative Data Analysis

The measurement data originated from standardized tests that rated participant grammar and vocabulary knowledge before and after testing along with recordings made by the automated chatbot. Partnered sample t-tests confirmed essential grammar and vocabulary improvements among participants from the pre-test to the post-test after 6 weeks of AI chatbot interaction. For this analysis the t-test proved suitable because it examines changes in identical pre- to post-intervention scores of the same participants to detect meaningful statistical differences.

Descriptive data analysis methods were used to study interaction records from the designed chatbot interface. The system recorded key operational data including participant frequency and completion rates and time spent engaged with each exercise. A detailed analysis of the logged data revealed key patterns regarding user interactions by showing task completion frequencies alongside task duration variabilities and detected error types. The researcher examined through this data if participants who engaged more with the tool achieved better progress in both vocabulary and grammar. A correlational analysis assessed

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ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL

the relationships between chatbot usage frequency and language proficiency improvement levels to provide better understanding of regular AI tool interactions effects.

Qualitative Data Analysis

Research analysts deployed thematic analysis to process the qualitative information from semi-structured interview results because this method illuminates patterns in qualitative data. Thematic analysis involved several steps: The researcher read and carefully re-read all interview transcripts to achieve knowledge about the collected data. The research team generated codes which captured essential data segments linked to major study inquiries about participant opinions of the chatbot's functionality together with their interaction levels and observed barriers. Researchers organized their initial coded data into broader thematic categories which revealed common patterns throughout the collected data.

The themes were organized around key areas such as:

User engagement: Research analyzed participant-to-chatbot interactions to understand how users handled the system while looking into why they used it and how often they engaged.

Effectiveness of the chatbot: Participants evaluated the performance of the chatbot regarding grammar and vocabulary education together with their positive or negative experiences regarding its features.

Learning experience:Participants described the impact of the chatbot technology on their language acquisition process including its relationship with conventional teaching techniques.

Challenges: The analysis includes reporting all problems that users encountered throughout their chatbot usage including technical problems alongside problems regarding usability and learning obstacles.

Thematic analysis delivered deep qualitative understanding between participants' experiences that revealed potential better integration strategies of AI chatbots in language learning. The researcher used interview data to compare their findings with pre- and post-test quantitative statistics regarding the chatbot's influence on language instruction.

Results and Analysis

A comprehensive analysis of data findings appears in the results and discussion section while examining the effects of AI chatbots on English grammar and vocabulary acquisition. Our analysis incorporates quantitative findings from pre-test and post-test grading along with interaction logs and qualitative participant interview responses.

1. Quantitative Results: Pre-test and Post-test Scores

A paired sample t-test analysis compared participant pre- and post-test scores to evaluate grammar and vocabulary knowledge transformations during the 6-week intervention period. Statistical analysis revealed that the AI chatbot users displayed meaningful score increases during the research period.

Table 2: Pre-test and Post-test Scores (Experimental Group)

Participant Group	Pre-test Score (Mean ± SD)	Post-test Score (Mean ± SD)	t-value	p-value
Experimental Group (n=30)	62.1 ± 10.3	78.9 ± 9.1	-7.39	0.000
Control Group (n=30)	63.4 ± 11.5	65.0 ± 10.6	-1.21	0.235

Note: $p < 0.05$ was considered statistically significant.

Data from the Experimental Group indicated an average jump of 16.8 points (from 62.1 to 78.9) due to the AI chatbot utilization which produced a significant t-value of -7.39 at

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$p < 0.000$ indicating improved vocabulary and grammar learning outcomes. Students in the Control Group maintained their score levels at 63.4 points through traditional instruction before returning to 65.0 points at the end of the study period. These successive measurements failed to demonstrate statistical significance ($p = 0.235$).

The results demonstrate that Experimental Group members showed better improvements in language skills relative to Control Group test scores. The study demonstrates that participants accomplished Language proficiency goals through their interactions with the AI chatbot across grammar and vocabulary skills.

2. **Analysis of AI Chatbot Interaction Logs**

Recorded interactions with the AI chatbot system showed essential behavioral data related to user participation. Participants in the Experimental Group spent an average of 35 grammatical exercises and 28 vocabulary tasks per week through the program. Participants interacted with the chatbot for a period of 1.5 to 3 hours each week but the duration matched their performance level.

Table 3. Chatbot Interaction Metrics (Experimental Group)

Participant ID	Exercises Completed (Mean ± SD)	Time Spent (hours per week)	Types of Errors Identified
P1	34 ± 5	2.5	Syntax, Tense Usage
P2	30 ± 6	2.0	Vocabulary, Word Choice
P3	38 ± 4	3.0	Prepositions, Articles
P4	29 ± 7	1.5	Verb Forms, Adjectives
P5	36 ± 6	2.2	Spelling, Collocations

Excessive learner interaction (2.5 hours per week on average) directly led to better language proficiency improvements. Analysis of learner performance through interactions revealed customized exercise selection based on their proficiency levels by the chatbot system. The participants encountered challenges mostly in tense usage together with prepositions and problematic lexicon selection. The survey results match existing research which demonstrates that AI tools implement personalized learning solutions that boost language mastery for students (Chung et al., 2023; Reinders & White, 2020).

Participants demonstrated uniform levels of engagement with the chatbot during each week of the 6-week period according to the average time spent on interactions presented in the graph. Time spent interacting with the language proficiency system directly impacts accomplishment and proves the necessity of concentrated regular communication for language education success.

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ISSN P:2709-8265
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2. Qualitative Results: Semi-structured Interviews

The semi-structured interviews yielded important perspectives about how participants used the AI chatbot. Thematic analysis revealed several key themes that influenced the effectiveness of the chatbot in enhancing language acquisition:

User Engagement

Users showed particularly high levels of interaction with the chatbot because of its customized programming. Participants found that the chatbot's feedback assessment together with immediate progress tracking served as crucial factors in keeping them motivated to use it repeatedly. The participant embraced the chatbot's ability to give instant feedback which adapted to their learning level. Through this experience learning acquired the narrative element of an engaging discussion.

Effectiveness of Feedback

All participants recognized the time efficiency of the chatbot system which quickly corrected their grammar and vocabulary mistakes. Students derived value from receiving quick feedback because they learned more effectively to identify and correct their mistakes for improved language use. The participants expressed mixed feelings about the feedback system because some claimed it lacked contextual relevance. Analysis reveals that AI chatbots successfully deliver correctional feedback but additional development needs to happen to make this feedback more contextually rich and natural in tone (Huang & Chang, 2022).

Challenges and Limitations

A few participants faced technological difficulties because the AI system sometimes delayed responses or made incorrect suggestions particularly in particular situations. Flaws in present-day artificial intelligence technologies limit their ability to mimic human interaction thereby modifying user experience together with learning performance (Vassallo, 2021).

Table 4. Summary of Key Themes from Interviews

Theme	Description	Example Quotes
User Engagement	High motivation and engagement due to personalized interaction	"The chatbot felt like it was teaching me."
Effectiveness of Feedback	Immediate, but sometimes mechanical feedback	"It corrected my mistakes quickly, but it was not always clear why."
Challenges and Limitations	Technical issues and lack of contextual nuance	"Sometimes the chatbot didn't understand my question."

Through personalized interactions AI chatbots demonstrate their ability to enhance language learning engagement as shown in the user engagement theme. Feedback effectiveness demonstrates why chatbot platforms must develop better methods to deliver clear and detailed error correction specified for both grammar rules and vocabulary usage.

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The current technical restrictions block the chatbot from offering interactive contextual feedback like a human instructor thus preventing it from reaching maximum usage potential.

The results support previous studies that analyze AI language learning devices demonstrating both their strengths and technical restrictions (Vassallo, 2021; Huang & Chang, 2022). The improvements needed for AI chatbots manifest in context-aware feedback processing systems and natural language processing threshold surpassing. Users maintain higher satisfaction levels combined with better engagement in their learning process when AI systems present interactions that mimic human dialogue which in turn produces superior language acquisition results.

Discussion

Through personalized interactions AI chatbots demonstrate their ability to enhance language learning engagement as shown in the user engagement theme. Feedback effectiveness demonstrates why chatbot platforms must develop better methods to deliver clear and detailed error correction specified for both grammar rules and vocabulary usage. The current technical restrictions block the chatbot from offering interactive contextual feedback like a human instructor thus preventing it from reaching maximum usage potential.

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Impact on Vocabulary Acquisition

Vocabulary knowledge growth became notably stronger for the Experimental Group according to research findings which encompassed increased abilities in word identification as well as correct spelling and contextual application. The outcomes show how the AI chatbot introduced target words in context while offering multiple exposures to build vocabulary acquisition. According to the input hypothesis proposed by Krashen (1985) learners need comprehensible input to acquire new vocabulary. The personalized vocabulary exercises combined with contextual learning activities within AI chatbots drive how individuals acquire deeper word understanding.

New investigations add additional evidence to backing these results. Huang & Chang (2022) demonstrate how AI tools namely chatbots enhance educational success in spoken vocabulary acquisition by combining vocabulary items into meaningful dialogues during task-based learning. Through its ability to create examples and personalized conversations according to learner proficiency levels Vassallo (2021) highlights the benefits of contextualized vocabulary learning. Results from Chung et al. (2023) line up with our study's findings about vocabulary improvement since learners who used AI-driven tools more often demonstrated better vocabulary performance. By embedding vocabulary within authentic situations the chatbot achieves two vital outcomes for word retention: students remember new words better (Godwin-Jones 2020).

User Engagement and Learning Dynamics

This research revealed that user engagement became a principal focus due to AI chatbots enabling personalized conversations which motivated learners effectively. The interactive learning setup rose from the chatbot's speed to respond as well as its adaptive response mechanism that followed learner feedback. Research presented by Almarashdeh and

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ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL

Alzahrani (2022) shows engagement levels of learners determine their success in language acquisition. Through AI-powered bot systems learners practice their language abilities in an environment without consequences yet receive guidance so they feel comfortable attempting more tasks in their studies (Reinders & White, 2020).

Based on Vassallo's (2021) research AI-based chatbots function as personalized instructional tools that produce better student engagement results than standardized learning strategies. Through its interactive function which triggered ongoing dialog and customized reactions the chatbot maintained student dedication during the entire research period. User performance data to which the chatbot adjusts difficulty levels helps maintain learner engagement by striking a necessary balance between challenge and overwhelming stress (Chung et al, 2023). Chatbot technology incorporated gamification through exercise completion rewards that probably heightened motivation as described in research by Huang and Chang (2022). AI chatbot interactions with continually evolving activity and interactivity demonstrate rising potential to increase student motivation along with engagement levels into the future.

Linguistic Development Over Time

Detecting development patterns in grammar and vocabulary evolution becomes possible through the extended study which tracks continuous AI chatbot engagement. The study shows participant language skill improvement through a step-by-step process because constant chatbot interaction enables learning to build progressively. The bot's consistent feedback systematically directed participants towards long-term language development across the six-week period. Huang & Chang (2022) discovered that extensive exposure to AI tools through time led English speakers to achieve progressive language skill development through regular practice with the system.

Results from this research study match the conclusions of Golonka et al. (2022) who demonstrated that continuous engagement with similar material through AI tools enhances language structure learning effectiveness. The study design's extended timeline parallels Zimmerman's (2021) work on self-regulated learning because learners who practice regularly with feedback make substantial progress overtime. The chatbot adapts to learners' developmental stage by providing progressively challenging tasks which enhance their ability to think critically and solve problems in language use (Chung et al., 2023).

Limitations and Future Research Directions

This research provides meaningful knowledge about AI chatbots' role in language acquisition although it faces specific restrictive factors. New research should investigate AI chatbots' effects on language skills beyond grammar and vocabulary because speaking and listening comprehension forms fundamental components of language abilities (Godwin-Jones, 2020). The study's conclusions were affected by unregulated external factors like learner-based knowledge and drive levels since no parameters were used for assessment. Additions to the methodology need to address external factors that may impact the results of chatbot research while examining their combined effects with chatbot utilization.

AI chatbots need research to discover methods which boost contextual feedback responsiveness and enhance language processing capacity because present bots restrict complex language outputs (Vassallo, 2021). The pedagogical effectiveness of the chatbot system can be improved through enhanced capacity for processing speaking tasks and accepting multimodal feedback according to González-Lloret & Naismith (2021).

Conclusion

These findings demonstrate that artificial intelligence chatbots effectively contribute to grammar learning alongside vocabulary acquisition improvement. AI chatbots create major educational implications for language education because they deliver tailored feedback and

ISSN E: 2709-8273
ISSN P:2709-8265
JOURNAL OF APPLIED LINGUISTICS AND TESOL
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dynamically adjust learning materials and maintain motivated student participation. Through its system of consistent practice the chatbot transforms long-term linguistic development which represents a key advantage of AI technology in language education. Research on theFieldValue of AI technology for different language abilities and educational environments must continue to optimize its benefits which are critical for Second Language Acquisition systems.

Recommendations

The research findings suggest future development of AI chatbot systems should deliver customized adaptive feedback for learners according to their personal needs specifically in terms of grammar and vocabulary mastery. The functional expansion of chatbots to add speaking and listening capabilities would deliver Students a more comprehensive language training environment that allows them to develop diverse skills through realistic social interactions. The functionality of chatbots should advance in order to provide feedback with contextual relevance while accounting for cultural sensitivity to both bolster linguistic progress and enable improved communication in all settings. An ideal learning condition requires blended learning systems that unite chatbot technology with conventional teaching practices. Future investigations must examine how AI chatbots affect language mastery among multivaried learner demographics at different skill sets with distinct cultural backgrounds.

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