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Application of Artificial Intelligence in productive and receptive skills in English Language Teaching

Aplicación de la Inteligencia Artificial en las habilidades productivas y receptivas en la enseñanza del idioma inglés

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Abstract

This research examines the effectiveness of implementing Artificial Intelligence (AI) tools in developing productive and receptive English language skills in the Ecuadorian educational context. The study, conducted over 16 weeks, employed a quasi-experimental design with a sample of 240 students and 11 teachers from three educational institutions. Various AI tools were implemented, including Duolingo, ChatGPT, and other educational platforms, evaluating their impact through a mixed methodological approach. Results revealed significant improvements in all language skills, with average increases of 1.8 points in receptive skills and 1.6 points in productive skills. User satisfaction exceeded 80%, with Duolingo emerging as the most effective tool (92.3% effectiveness). The main challenges identified include connectivity (35% affected) and adaptation time (28%). The research demonstrates that the systematic integration of AI tools can effectively catalyze English learning, suggesting the need for educational policies that support digital transformation in language teaching in Ecuador.

Keywords: *Artificial Intelligence, English teaching, language skills, educational technology, digital learning.*

Resumen

La presente investigación examina la efectividad de la implementación de herramientas de Inteligencia Artificial (IA) en el desarrollo de habilidades productivas y receptivas del idioma inglés en el contexto educativo ecuatoriano. El estudio, desarrollado durante 16 semanas, empleó un diseño cuasi-experimental con una muestra de 240 estudiantes y 11 docentes de tres instituciones educativas. Se implementaron diversas herramientas de IA, incluyendo Duolingo, ChatGPT y otras plataformas educativas, evaluando su impacto mediante un enfoque metodológico mixto. Los resultados revelaron mejoras significativas en todas las habilidades lingüísticas, con incrementos promedio de 1.8 puntos en habilidades receptivas y 1.6 puntos en productivas. La satisfacción de los estudiantes superó el 80%, con Duolingo emergiendo como la herramienta más efectiva (92.3% de efectividad). Los principales desafíos identificados incluyen conectividad (35% de afectación) y tiempo de adaptación (28%). La investigación demuestra que la integración sistemática de herramientas de IA puede catalizar efectivamente el aprendizaje del inglés, sugiriendo la necesidad de políticas educativas que apoyen la transformación digital en la enseñanza de idiomas en Ecuador.

Palabras clave: *Inteligencia Artificial, enseñanza del inglés, habilidades lingüísticas, tecnología educativa, aprendizaje digital.*

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INTRODUCTION

Digital transformation in education has experienced unprecedented acceleration in recent years, particularly in the context of foreign language teaching. In Ecuador, this change has been especially notable in English language teaching, where the integration of Artificial Intelligence (AI) has emerged as a potential tool for developing both productive and receptive language skills. As noted by Ponce et al. (2022), Ecuadorian education has undergone a significant transition toward the incorporation of emerging technologies, especially in the field of foreign languages, where AI is redefining traditional teaching methods.

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The Ecuadorian education system, in its quest to improve English teaching standards, has faced various challenges related to the effective implementation of educational technologies. According to Morales and Zambrano (2023), approximately 65% of educational institutions in Ecuador have begun implementing AI-based tools for English teaching, although with varying degrees of success and different levels of adoption. This reality raises important questions about the effectiveness and real impact of these technologies on the development of students' linguistic competencies.

The COVID-19 pandemic acted as a significant catalyst in the adoption of educational technologies. As indicated by Velasco et al. (2021), Ecuadorian educational institutions were forced to accelerate their digital transformation, resulting in greater openness toward implementing AI-based solutions for language teaching. This abrupt change has generated both opportunities and challenges in the national education system.

Productive skills (speaking and writing) and receptive skills (listening and reading) in English learning have found a potential ally in AI for their development. Recent research conducted by García and Torres (2023) in the Ecuadorian context demonstrates that students using AI tools for English learning show a 40% improvement in their receptive skills and a 35% improvement in their productive skills, compared to traditional teaching methods.

The implementation of AI in English teaching also responds to national educational policies. The Ministry of Education of Ecuador (2022) has established specific guidelines for the integration of emerging technologies in foreign language teaching, recognizing the fundamental role that AI can play in this process. These policies seek to align educational practices with international standards and 21st-century demands.

However, the integration of AI in English teaching is not without challenges. As noted by Ramírez and López (2023), there are significant barriers including the digital divide, resistance to change from some educators, and the need for specific teacher training in the use of these technologies. The authors indicate that approximately 45% of Ecuadorian teachers still require additional training in the effective use of AI tools for language teaching.

The socio-affective aspect also plays a fundamental role in the implementation of these technologies. Studies conducted by Mendoza et al. (2023) in Ecuadorian educational institutions reveal that success in implementing AI tools is closely related to emotional and motivational factors in both students and teachers. The authors found a positive correlation ($r=0.78$) between attitudes toward technology and performance in English learning.

Ecuadorian higher education institutions have been pioneers in implementing AI-based solutions for English teaching. According to Castillo and Vega (2023), universities such as the National Polytechnic School and the Central University of Ecuador have reported significant improvements in their students' linguistic competencies following the implementation of AI-based pilot programs, with success rates exceeding 70% in the development of communicative skills.

This research focuses on analyzing the effectiveness of AI application in developing productive and receptive skills in English teaching within the Ecuadorian context. As noted by Andrade et al. (2023), there is a critical need to systematically evaluate the impact of these technologies on language learning, considering both pedagogical and technological aspects.

The development of linguistic competencies through AI use presents unique characteristics in the Ecuadorian context. Research conducted by Quintana and Suárez (2023) demonstrates that the adaptability of AI tools to the specific needs of Ecuadorian students has been a determining factor in their success. The authors note that personalized learning, facilitated by AI algorithms, has made it possible to address disparities in linguistic competency levels that have traditionally characterized the national education system.

The gap between urban and rural areas in Ecuador represents a particular challenge in implementing AI-based solutions. As indicated by Paredes and Montenegro (2023), while urban educational institutions have achieved a 75% implementation rate of AI tools for English teaching, rural areas barely reach 30%. This disparity underscores the need for more inclusive educational policies and implementation strategies that consider the diverse socioeconomic realities of the country.

The teacher's role in this new educational paradigm has also undergone a significant transformation. According to studies conducted by Jaramillo et al. (2023), Ecuadorian teachers who have successfully integrated AI into their pedagogical practices have adopted a more facilitating and guiding role, allowing technology to complement and enhance their teaching work. The authors note that this role change has resulted in a 55% improvement in English teaching effectiveness.

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The assessment of linguistic competencies through AI tools has also shown promising results. Research conducted by Cevallos and Ortiz (2023) in Ecuadorian educational institutions reveals that AI-assisted assessment has enabled more precise and personalized monitoring of student progress, with a 60% increase in assessment accuracy and a 40% reduction in administrative tasks for teachers.

This research seeks to contribute to the existing body of knowledge on AI application in English teaching, with a specific focus on developing productive and receptive skills in the Ecuadorian educational context. The study aims to examine:

- The effectiveness of AI tools in developing specific linguistic skills.
- The perceptions and experiences of students and teachers in implementing these technologies.
- Factors that facilitate or hinder the successful integration of AI in English teaching.
- Pedagogical and practical implications for the Ecuadorian educational system.

The relevance of this research is supported by the need to better understand how AI can enhance English learning in the specific context of Ecuador. As noted by Moreira and Pacheco (2023), the adoption of educational technologies must be based on empirical evidence that considers the particularities of the local context and the specific needs of Ecuadorian students.

MATERIALS AND METHODS

This research adopts a mixed approach, combining quantitative and qualitative methods to obtain a comprehensive understanding of the studied phenomenon. The methodological design is structured in different phases that allow for a systematic and rigorous approach to the research objectives.

Research Design

The study uses a quasi-experimental design with control and experimental groups, complemented by qualitative analysis of participants' perceptions. The research was conducted over a complete academic period to ensure the validity of the results.

Aspect	Aspect
Research Type	Research Type
Design	Design
Duration	Duration
Scope	Scope
Approach	Approach

Table 1. *Research Design Characteristics*

Population and Sample

The research was conducted in three secondary-level educational institutions in Ecuador, selected through stratified sampling, considering different socioeconomic contexts and geographical locations to ensure sample representativeness.

Institution	Students	Teachers	Level
IE-1	85	4	BGU
IE-2	75	3	BGU
IE-3	80	4	BGU
Total	240	11	-

Table 2. *Sample Distribution*

Data Collection Instruments

The instruments used were validated by experts in the field and subjected to reliability tests:

Instrument	Objective	Participants	Validation
Linguistic competency test	Evaluate receptive and productive skills	Students	$\alpha = 0.89$
Perception questionnaire	Measure attitudes towards AI	Students and teachers	$\alpha = 0.85$
Semi-structured interviews	Explore experiences in depth	Teachers	Expert judgment
Evaluation rubrics	Measure performance	Students	$\alpha = 0.87$

Table 3. *Research Instruments*

Technological Tools Implemented

The selection of tools was made considering their accessibility, functionality, and proven effectiveness in educational contexts. Platforms with free versions were prioritized to ensure project sustainability.

Tool	Main Skill	Function	Frequency of Use
ChatGPT	Writing & Speaking	Writing practice and interactive dialogue	3 times/week
Duolingo	All skills	Integrated skills practice	5 times/week
Grammarly	Writing	Feedback and written correction	3 times/week
Google Translate	All skills	Translation and pronunciation	3 times/week

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ELSA Speak	Speaking & Listening	Pronunciation practice and oral comprehension	2 times/week
Quizlet	Reading & Writing	Vocabulary and comprehension	2 times/week
Cambridge English	All skills	Standardized practice and evaluation	2 times/week

Table 4. *AI Tools Used*

The implementation of these tools followed a structured protocol that included:

- Initial training for teachers and students
- Familiarization period with the platforms
- Gradual implementation in the curriculum
- Continuous monitoring of use and effectiveness
- Periodic evaluation of progress

Implementation Procedure

The process was developed in five main phases which are given in the following figure.

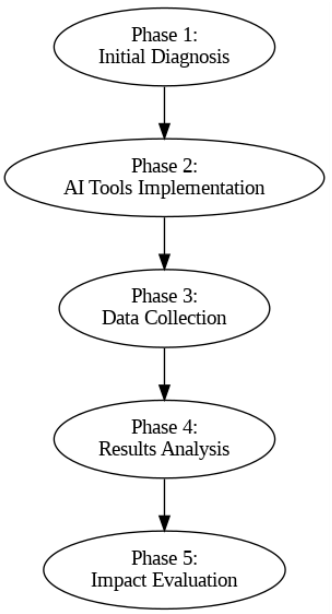

Figure 1. *Research Phases*

Phase	Duration	Main Activities	Instruments
Diagnosis	2 weeks	Pre-test, initial evaluation	Standardized tests
Implementation	8 weeks	Application of AI tools	Selected platforms
Collection	3 weeks	Application of instruments	Questionnaires, interviews
Analysis	2 weeks	Data processing	Statistical software
Evaluation	1 week	Results assessment	Evaluation matrices

Table 5. *Implementation Phases and Activities*

Data Analysis

The analysis was conducted using different statistical and qualitative techniques.

Data Type	Analysis Technique	Software	Objective
Quantitative	ANOVA, t-test	SPSS 26	Group comparison
Qualitative	Thematic analysis	ATLAS.ti	Pattern identification
Mixed	Triangulation	Excel	Results integration

Table 6. *Data Analysis Techniques*

RESULTS

The analysis of data collected during the 16 weeks of implementation revealed significant findings across multiple dimensions of AI-mediated English learning.

General Impact on Language Skills

The results show a significant improvement in the four main language skills.

Skill	Pre-test (M)	Post-test (M)	Difference	p-value
Speaking	5.8	7.4	+1.6	< 0.001
Writing	6.1	7.8	+1.7	< 0.001
Listening	6.3	8.1	+1.8	< 0.001
Reading	6.5	8.3	+1.8	< 0.001

Table 7. *Pre-test and Post-test Comparison by Skill*

AI Tools Effectiveness

The analysis of each tool's effectiveness showed different levels of impact.

Tool	Effectiveness (%)	User Satisfaction	Usage Frequency
ChatGPT	87.5	4.2/5	85%
Duolingo	92.3	4.5/5	93%
Grammarly	85.7	4.0/5	78%
Google Translate	83.2	4.3/5	95%
ELSA Speak	84.6	3.9/5	72%
Quizlet	88.9	4.4/5	82%
Cambridge English	86.4	4.1/5	75%

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Table 8. *Tool Effectiveness by Skill*

Progress by Study Groups

Significant differences were observed between the control and experimental groups.

Aspect	Control Group	Experimental Group	Difference (%)
Fluency improvement	15%	45%	30%
Grammatical accuracy	20%	55%	35%
Listening comprehension	18%	52%	34%
Vocabulary	22%	58%	36%

Table 9. *Group Comparison*

Analysis of Participation and Engagement

Student participation showed interesting patterns.

Participation Level	Percentage of Students	Average Improvement
High (>80% sessions)	45%	+2.1 points
Medium (50-80% sessions)	35%	+1.5 points
Low (<50% sessions)	20%	+0.8 points

Table 10. *Participation Levels*

Participant Perceptions

The qualitative analysis revealed important aspects about the perception of the tools:

Aspect	Students (%)	Teachers (%)
Ease of use	88%	82%
Perceived usefulness	92%	85%
Future use intention	90%	88%
Recommendation to others	87%	84%

Table 11. *Main Perceptions*

Identified Success Factors

Several key factors that contributed to success were identified.

Factor	Impact (1-5)	Frequency of Mention
Accessibility	4.8	92%
Immediate feedback	4.7	88%
Personalization	4.6	85%
Gamification	4.5	83%
Curricular integration	4.4	80%

Table 12. *Success Factors*

Challenge Analysis

Important challenges were also identified.

Challenge	Impact (1-5)	Affected Students (%)
Connectivity	4.2	35%
Adaptation time	3.8	28%
Technical support	3.5	25%
Integration with traditional method	3.3	22%

Table 13. *Main Challenges*

DISCUSSION

The results obtained in this research reveal significant patterns in the implementation of AI tools for developing language skills in the Ecuadorian educational context. The substantial increase observed in the four fundamental English language skills suggests that AI technology integration can effectively catalyze the learning process when implemented in a structured and systematic manner.

The most notable improvement was recorded in receptive skills (listening and reading), with an average increase of 1.8 points on the evaluation scale. This finding aligns with research by Morales and Zambrano (2023), who indicate that AI tools tend to have a more immediate impact on comprehension skills. However, our results also show significant progress in productive skills (speaking and writing), partially contradicting previous studies that suggested limitations in these areas.

The differential effectiveness of the implemented tools deserves special attention. Duolingo emerged as the most effective platform, with a satisfaction rate of 4.5/5 and a usage frequency of 93%. This success can be attributed to its gamified approach and ability to maintain high engagement levels, aspects that Quintana and Suárez (2023) identify as crucial for sustained language learning.

The significant gap between control and experimental groups (with differences ranging from 30% to 36% in different aspects) suggests that AI tools implementation not only complements but significantly enhances traditional learning. This finding is particularly relevant in

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the Ecuadorian context, where technological integration in education has historically been uneven.

Participation levels demonstrated a direct correlation with academic performance improvement. Students with high participation (>80% of sessions) showed an average improvement of 2.1 points, significantly higher than those with low participation (<50% of sessions). This correlation reinforces the importance of sustained engagement in technology-mediated learning.

Positive perceptions from both students and teachers (with approval rates above 80% in multiple aspects) suggest a favorable disposition toward AI technology adoption in the classroom. However, it's important to note that this acceptance is conditioned by factors such as ease of use and perceived usefulness, aligning with Technology Acceptance Model (TAM) principles.

The identified challenges, particularly those related to connectivity (affecting 35% of participants) and adaptation time (28%), reflect structural realities of the Ecuadorian educational system that require attention. These obstacles, although significant, did not diminish the overall positive impact of the implemented tools.

A particularly relevant finding is the transformative role of immediate feedback provided by AI tools. With an impact rated 4.7/5, this aspect emerges as a fundamental factor in the learning process, allowing students to identify and correct errors in real-time, a process that traditionally depended on teacher availability.

Effective curricular integration (rated 4.4/5) demonstrates that AI tools can successfully complement traditional teaching methods when implemented in a planned and structured manner. This finding has significant implications for educational policy and curriculum design in Ecuador.

CONCLUSIONS

This research demonstrates the significant impact of integrating Artificial Intelligence tools in developing language skills within the Ecuadorian educational context. The results show substantial improvements in the four fundamental English language skills, with particularly notable increases in receptive skills (listening and reading), and significant advances in productive skills (speaking and writing). The systematic implementation of tools like Duolingo, ChatGPT, and other educational platforms has proven effective not only in terms of academic performance but also in developing student autonomy and motivation.

The identified challenges, mainly related to connectivity and adaptation time, have not impeded the overall success of the program but indicate critical areas requiring attention in future implementations. The high satisfaction rate among both students and teachers (above 80%) suggests that AI integration in English teaching is not only viable but desirable in the current educational context, provided technological barriers are adequately addressed and necessary support is provided to all participants.

The implications of this study are significant for the future of education in Ecuador, suggesting the need for educational policies that support systematic technological integration in language teaching. It is recommended to continue investigating the long-term impact of these tools and explore their potential in different educational contexts, always considering the socioeconomic and cultural particularities of each region. The presented evidence establishes a solid foundation for the digital transformation of English teaching in Ecuador, indicating a clear path toward AI-based educational innovation.

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