Artificial intelligence: the impact on English learning in Goma, Democratic Republic of the Congo

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Abstract

Artificial Intelligence (AI) has become an increasingly influential tool in language education by enabling personalized instruction, adaptive feedback, and learner-centered environments. While extensive research has explored AI-assisted language learning in technologically advanced contexts, limited empirical evidence exists from low-resource and conflict-affected regions such as Goma, the Democratic Republic of the Congo (DRC). This study examines the impact of AI on English language learning outcomes, learner motivation, and instructional practices in Goma. Using a mixed-methods research design, data were collected from 320 secondary school and university learners and 24 English teachers over a twelve-week intervention period. Quantitative data were obtained through pre- and post-tests measuring vocabulary, reading comprehension, and writing accuracy, while qualitative data were gathered via questionnaires and semi-structured interviews. Results indicate statistically significant improvements in English proficiency among learners exposed to AI-assisted instruction compared to those receiving traditional instruction ($p < .05$, this shows that the results were statistically significant). Qualitative findings reveal increased motivation, learner autonomy, and confidence, alongside challenges related to infrastructure, internet connectivity, and teacher preparedness. The study concludes that AI holds considerable potential to enhance English learning in Goma if contextual constraints are systematically addressed.

Keywords: *Artificial Intelligence (AI), Learner motivation, Educational technology, Pedagogical autonomy, Internet connectivity.*

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Résumé

L'intelligence artificielle (IA) s'impose comme un outil majeur dans l'enseignement des langues en offrant des dispositifs d'apprentissage personnalisés, adaptatifs et centrés sur l'apprenant. Bien que de nombreuses études aient analysé l'apprentissage des langues assisté par l'IA dans des contextes technologiquement avancés, les données empiriques restent limitées dans des régions à faibles ressources et touchées par l'instabilité, telles que Goma, en République démocratique du Congo (RDC). Cette étude analyse l'impact de l'IA sur les performances en anglais, la motivation des apprenants et les pratiques pédagogiques à Goma. Une méthodologie mixte a été adoptée auprès de 320 apprenants du secondaire et de l'université ainsi que de 24 enseignants d'anglais sur une période de douze semaines. Les données quantitatives proviennent de tests pré- et post-expérimentaux évaluant le vocabulaire, la compréhension écrite et la précision grammaticale, tandis que les données qualitatives ont été recueillies par questionnaires et entretiens semi-directifs. Les résultats révèlent des améliorations statistiquement significatives chez les apprenants bénéficiant de l'enseignement assisté par l'IA ($p < .05$, cela montre que les résultats sont statistiquement significatifs). Les résultats qualitatifs indiquent une augmentation de la motivation, de l'autonomie et de la confiance, malgré des contraintes liées aux infrastructures, à l'accès à Internet et à la formation des enseignants. L'étude conclut que l'IA peut améliorer considérablement l'apprentissage de l'anglais à Goma si les contraintes contextuelles sont prises en compte de manière systématique.

Mots-clés: *Intelligence Artificielle (IA), Motivation des apprenants, technologie éducative, Autonomie pédagogique, Connectivité Internet.*

I. Introduction

English has gained increasing importance in the Democratic Republic of the Congo due to globalization, regional mobility, and international academic and economic exchanges. In urban centers such as Goma, English proficiency is often associated with access to higher education, employment opportunities, and cross-border communication. Despite this growing relevance, English language learning outcomes remain relatively low, largely due

to structural constraints such as overcrowded classrooms, limited teaching materials, and insufficient exposure to authentic language input (Mukendi, 2023). Goma presents a unique sociolinguistic environment characterized by multilingualism, where Kiswahili, French, and local languages coexist. English is primarily taught as a foreign language, often with limited instructional hours and minimal technological support. These conditions pose significant challenges to effective language acquisition and call for innovative pedagogical solutions.

Artificial Intelligence (AI) refers to computer systems designed to simulate human intelligence, such as learning, problem-solving, and decision-making. It has recently emerged as a promising tool capable of addressing some of these challenges by enabling adaptive learning pathways, immediate feedback, and learner-centered instruction (Holmes et al., 2022). AI-powered applications such as intelligent tutoring systems, grammar checkers, and conversational agents offer opportunities for individualized practice that traditional classroom settings in Goma often cannot provide. However, the integration of AI in education raises important questions related to accessibility, pedagogical effectiveness, and contextual relevance. In low-resource and conflict-affected regions, technological innovations may exacerbate existing inequalities if not carefully implemented (UNESCO, 2021). This study therefore seeks to empirically examine the impact of AI-assisted English learning in Goma, focusing on both learning outcomes and stakeholder perceptions. The study aims to:

i. Examine the effect of AI-assisted instruction on English language proficiency in Goma.
ii. Explore learners' and teachers' perceptions of AI in English language learning.
iii. Identify contextual challenges affecting the implementation of AI-based instruction.

II. Methodology

1. Research Design

À quasi-experimental mixed-methods research design combining pre- and post-tests with interviews and questionnaires was employed to ensure a balanced and comprehensive analysis of the impact of AI on English learning. Quantitative methods allowed for the

measurement of learning gains, while qualitative methods provided insights into experiences, attitudes, and contextual factors.

2. Participants

The study involved 320 learners drawn from four secondary schools: Mwanga secondary school, Byahi technical school, Maendeleo secondary school as well as Goma secondary school (Instigo) and one higher education institution in Goma: Adventist University of Goma (UAGO). Participants ranged in age from 15 to 26 years. Additionally, 24 English language teachers participated in interviews and questionnaires. Purposive sampling was used to select institutions with minimal access to digital tools to reflect realistic learning conditions.

3. Instructional Tools and Materials

AI tools utilized during the intervention included:

AI-powered grammar and writing assistants

Conversational chatbots for speaking practice

Adaptive vocabulary learning applications

These tools were selected based on accessibility, mobile compatibility, and relevance to English language learning objectives.

AI tools have been available in Goma only since the last few years, mainly through pilot projects and educational initiatives.

4. Procedure

The intervention lasted twelve weeks. Participants (learners drawn from four secondary schools and one higher education institution in Goma) were divided into two groups:

An experimental group receiving AI-assisted English instruction

A control group receiving traditional instruction

Both groups followed the same curriculum content. Pre-tests were administered prior to the intervention, and post-tests were administered at the end of the study.

5. Data Analysis

Quantitative data were analyzed using paired-sample t-tests to determine differences in performance between groups. Qualitative data were analyzed thematically through systematic coding and categorization (Braun & Clarke, 2019).

6. Ethical Considerations

Ethical standards were strictly observed throughout the research process. Prior to data collection, permission was obtained from school administrators and institutional authorities. All participants were informed about the objectives of the study, the voluntary nature of their participation, and their right to withdraw at any time without consequences. Informed consent was obtained from all participants, and for learners under the age of 18, consent was also secured from school authorities acting in loco parentis. Participants' identities were anonymized to protect confidentiality. Data were stored securely and used exclusively for academic purposes. Special attention was paid to ethical concerns related to the use of Artificial Intelligence in education, including data privacy, academic integrity, and responsible use. Learners were instructed to use AI tools as learning aids rather than as substitutes for independent thinking or assessment completion.

7. Reliability and Validity of the Study

To ensure reliability, standardized English proficiency tests were used consistently across both experimental and control groups. The same testing conditions were maintained during pre- and post-test administration. Internal consistency was verified through repeated measures. Validity was strengthened through methodological triangulation. Quantitative results were supported by qualitative findings from interviews and questionnaires, enhancing

construct validity. The use of multiple data sources allowed for cross-verification of findings and reduced potential researcher bias (Creswell, 2018).

III. Results

1. Quantitative Results

Analysis of pre- and post-test scores revealed significant improvements among learners in the AI-assisted group. Vocabulary acquisition showed an average increase of 18%, reading comprehension improved by 15%, and writing accuracy improved by 20%. These gains were statistically significant ($p < .05$). In contrast, the control group demonstrated only marginal improvements.

A comparative analysis of pre-test and post-test scores revealed clear differences between the experimental and control groups. Learners in the AI-assisted group demonstrated consistent improvement across all assessed language skills. Vocabulary acquisition showed the most immediate gains, with learners benefiting from adaptive repetition and personalized feedback provided by Artificial Intelligence applications. Writing accuracy also improved significantly, particularly in areas related to grammar, sentence structure, and coherence. Statistical analysis using paired-sample t-tests confirmed that the observed improvements in the experimental group were statistically significant ($p < .05$). By contrast, learners in the control group showed only modest gains, largely attributed to repeated exposure to the same instructional materials rather than methodological innovation. These findings suggest that AI-assisted instruction contributed meaningfully to enhanced learning outcomes beyond traditional teaching methods.

These results are supported by pre-and post-test comparisons analyzed with paired-sample t-tests. The reported percentages reflect measurable gains in vocabulary, reading, and writing, and the claim of statistical significance ($p < .05$) indicates the improvements are unlikely due to chance.

2. Qualitative Results

The questionnaires and interviews are not reproduced in full due to space and confidentiality constraints. Instead, the paper focuses on presenting the thematic analysis of responses, which captures the most relevant insights for the study.

Qualitative data obtained from questionnaires and interviews provided deeper insight into learner and teacher experiences. Three major themes emerged from the thematic analysis.

i. Increased Motivation and Engagement

A majority (over 160 of the 320 learners) reported that AI tools made English learning more engaging and enjoyable. Interactive features such as instant feedback, gamified tasks, and conversational simulations reduced anxiety and encouraged participation. While a portion of learners had prior experience with digital tools, the majority became familiar with A.I. applications during the twelve-week intervention. Learners expressed greater willingness to practice English outside the classroom, which is particularly significant in a context where instructional time is limited. Teachers also observed improved classroom participation among learners using AI tools, noting increased confidence in speaking and writing activities.

ii. Learner Autonomy and Self-Regulation

Another prominent theme was the development of learner autonomy. AI tools enabled learners to control the pace of their learning, repeat exercises as needed, and focus on individual weaknesses. This self-directed learning approach was especially beneficial in Goma, where class sizes often limit individualized teacher support. Learners reported feeling more responsible for their own progress, which aligns with principles of learner-centered pedagogy (Creswell, 2018). This approach shifts the focus from the teacher to the learner. It prioritizes student autonomy and responsibility, encouraging active engagement and self-directed progress rather than teacher-led instruction.

iii. Contextual and Technical Challenges

Despite positive perceptions, both learners and teachers highlighted several challenges. Limited internet connectivity, frequent power outages, and unequal access to digital devices constrained the consistent use of AI tools. This study confirms increased motivation and confidence among learners, adding direct evidence from Goma. Learners reported autonomy through self-paced repetition, reinforcing learner-centered pedagogy in our context. Teachers also reported insufficient training in AI integration, which reduced their confidence in effectively managing AI-assisted instruction (Kagaba & Nsimire, 2022). Beyond Kagaba & Nsimire's findings, our participants highlighted unequal device access as a key challenge.

IV. Discussion

The findings of this study demonstrate that Artificial Intelligence can significantly enhance English language learning outcomes in Goma. Improvements in vocabulary, reading comprehension, and writing accuracy indicate that AI-assisted instruction provides meaningful pedagogical advantages in low-resource contexts. The increase in learner motivation observed in this study supports the notion that interactive and adaptive technologies reduce affective barriers to language learning. By offering a non-judgmental environment, AI tools allow learners to experiment with language use without fear of negative evaluation, a common issue in overcrowded classrooms.

Learner autonomy emerged as a key benefit of AI integration. In contexts such as that in Goma, where educational disruptions are frequent, the ability to continue learning independently is particularly valuable. AI tools functioned as supplementary learning environments that extended instruction beyond the classroom. In practice, only a small proportion of learners can afford regular access to AI tools, given constraints of connectivity and device availability. However, the findings also underscore the importance of contextual factors. Technological infrastructure, teacher preparedness, and institutional support play a critical role in determining the effectiveness of AI-assisted learning. Without these elements, AI risks reinforcing existing inequalities rather than promoting educational equity (UNESCO, 2021).

Furthermore, concerns raised by teachers regarding over-reliance on AI highlight the need for balanced integration. AI should be viewed as a pedagogical support rather than a replacement for human instruction. Ethical considerations, including academic integrity and data privacy, must also be addressed to ensure responsible implementation.

- Balancing Opportunities and Risks

While the benefits of AI-assisted English learning are evident, it is essential to acknowledge potential risks. Unequal access to technology may deepen existing educational disparities. Learners without personal devices or stable internet connections are at a disadvantage, highlighting the importance of inclusive implementation strategies. Moreover, excessive reliance on AI tools may reduce critical thinking and creativity if not pedagogically guided. Teachers must play a central role in mediating AI use, ensuring that technology complements rather than replaces human interaction and instructional judgment. This balanced perspective reinforces the need for context-sensitive AI integration models tailored to the realities of Goma and similar low-resource environments.

- Pedagogical Implications

The results suggest that English teachers in Goma can benefit from incorporating AI tools into their instructional practices. AI can be used to:

Provide individualized feedback

Support differentiated instruction

Reinforce classroom learning

Teacher training programs focusing on digital pedagogy and AI literacy are essential for maximizing these benefits. Some initiatives are underway. Institutions like the **Institut Supérieur Pégagogique de Goma (Goma Teachers'Training College)** and UCS-GOMA provide teacher training, and UNESCO has recently supported AI and coding programs in the DRC aimed at empowering educators and students. However, these efforts are still limited and not yet widespread in Goma's schools.

- **Institutional Implications**

Educational institutions should prioritize investments in digital infrastructure, including reliable internet access and affordable devices. Partnerships with governmental and non-governmental organizations could facilitate access to context-appropriate AI tools. There is momentum, but progress will be gradual. Pilot projects and policy discussions are underway, yet in Goma the near future will likely bring incremental advances (training sessions, small partnerships) rather than full-scale transformation.

- **Policy Implications**

At the policy level, educational authorities should develop frameworks regulating AI use in schools. Policies should emphasize equitable access, ethical use, and alignment with national education goals (UNESCO, 2021).

- **Limitations of the Study**

While this study provides valuable insights, several limitations must be acknowledged. The twelve-week intervention period limits conclusions about long-term learning outcomes. Additionally, the study focused on urban institutions in Goma, which may not reflect existing conditions in rural areas. Variations in learners' access to personal devices may also have influenced results. Even in urban areas, access to personal devices remains problematic due to high costs, shared usage, and unreliable infrastructure, which limit consistent and equitable participation in AI-assisted learning. Future studies should adopt longitudinal designs, include rural contexts, and examine specific AI tools independently.

Conclusion

This study examines the impact of Artificial Intelligence on English language learning in Goma, Democratic Republic of the Congo. The findings indicate that AI-assisted instruction significantly improves English proficiency, learner motivation, and autonomy. These outcomes demonstrate the potential of AI to address persistent educational challenges in low-resource contexts.

However, the successful integration of AI depends on supportive infrastructure, teacher training, and policy frameworks. When these conditions are met, AI can serve as a powerful tool for enhancing language education and promoting educational equity in Goma and similar contexts as well as in rural areas.

Future research should:

i. Investigate long-term effects of AI-assisted English learning.
ii. Compare the effectiveness of different AI tools.
iii. Examine AI integration in rural and conflict-affected settings.
iv. Explore ethical considerations related to AI use in education.

Based on the findings, the following recommendations are proposed:

i. Teacher Training: Continuous professional development in AI pedagogy.
ii. Infrastructure Investment: Expansion of affordable internet and device access.
iii. Curriculum Integration: Inclusion of AI-supported learning activities in English syllabi. While AI shows promise, many educational decision-makers are not yet fully conversant with its pedagogical and technical dimensions, underscoring the need for targeted training and policy support.
iv. Ethical Guidelines: Development of clear policies governing AI use in education.
v. Community Partnerships: Collaboration with NGOs and ed-tech providers.

This study has hopefully demonstrated that Artificial Intelligence can significantly enhance English language learning in Goma, Democratic Republic of the Congo. Through improved proficiency, increased motivation, and greater learner autonomy, AI-assisted instruction offers a promising response to persistent educational challenges in low-resource contexts. However, technology alone is not a solution. Sustainable success depends on infrastructure, teacher competence, ethical oversight, and policy support. When implemented responsibly and equitably, AI can contribute meaningfully to improving English education and expanding opportunities for learners in Goma.

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