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Research Article

Artificial Intelligence-Assisted Chinese L2 Writing: An Empirical Study on Educational Sustainability in Africa

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Abstract

This study investigates the impact of ChatGPT on Chinese L2 writing proficiency among African students, aligning with the Sustainable Development Goals (SDGs) for quality education and reduced inequalities. Employing a mixed-methods approach, the research involved 46 participants to quantitatively assess improvements in syntactic and lexical complexity, accuracy, and fluency. Qualitative insights were garnered through semi-structured interviews, revealing positive perceptions of ChatGPT in enhancing writing skills, yet highlighting challenges like technological access and economic constraints. The findings suggest that while ChatGPT effectively enhances Chinese L2 proficiency, its integration in African educational contexts requires addressing infrastructural and pedagogical barriers. This study contributes to the discourse on Artificial Intelligence in language education and its role in advancing African sustainable educational practices.

Keywords: Artificial Intelligence, Chinese L2 Writing, Educational Sustainability, Africa, CAF.

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1. Introduction

Language learning, a cornerstone of educational advancement, plays a pivotal role in the global pursuit of sustainable development. The United Nations' Sustainable Development Goals (SDGs), particularly SDG 4, which emphasizes Quality Education, underscore the importance of inclusive and equitable quality education and promote lifelong learning opportunities for all (United Nations, 2015). Language education, in this regard, is not merely an academic pursuit but a key enabler of broader sustainable development objectives. The intricate relationship between language learning and sustainable development is multi-faceted. Firstly, proficiency in multiple languages can enhance individuals' capabilities, contributing significantly to their personal and professional development. This aligns with the aims of SDG 8 (Decent Work and Economic Growth) and SDG 10 (Reduced Inequalities), where language skills open doors to better employment opportunities and foster social inclusion (United Nations, 2015).

Furthermore, language learning fosters cross-cultural communication and understanding, which are vital in achieving SDG 16 (Peace, Justice, and Strong Institutions). The ability to communicate across linguistic barriers enhances global cooperation and understanding, essential in resolving conflicts and building peaceful societies. However, integrating language learning within the SDG framework poses its unique challenges. The diversity in linguistic backgrounds and the varying access to quality language education, especially in underprivileged regions, need to be addressed to achieve true educational sustainability (Bylund, 2023). UNESCO's emphasis on multilingual education highlights the importance of linguistic diversity in sustainable education systems ("Languages in Education," 2024).

The surge in economic collaborations between Africa and China in recent decades has elevated the significance of Chinese language proficiency within Africa's educational and economic realms. The growing presence of Chinese enterprises and investments in Africa has created a burgeoning demand for individuals proficient in Chinese (Abodohoui et al., 2018). This demand is not solely confined to the business sector but extends to various fields including education, tourism, and diplomatic services, reflecting the broader impact of China's global economic expansion. In the educational sector, the introduction of Chinese as a second language (L2) is increasingly viewed as a strategic asset. Educational institutions across Africa are progressively integrating Chinese language courses into their curricula, acknowledging the language's potential as a bridge to new cultural and economic opportunities (Owaki et al., 2019). This educational shift aligns with the broader objectives of equipping students with skills relevant to the global job market, particularly in sectors where China plays a pivotal role. Moreover, Chinese language skills are becoming instrumental in facilitating cross-cultural understanding and collaborations. As African nations engage more deeply with China, language proficiency emerges as a key facilitator of effective communication and mutual understanding (Xu, 2018). This linguistic competence is crucial not only for individual career advancement but also for fostering stronger bilateral ties between African countries and China.

However, the integration of Chinese L2 education within Africa's educational systems presents unique challenges, including the need for qualified teachers, appropriate learning materials, and pedagogical strategies that resonate with African learners. Addressing these challenges is

essential for harnessing the full potential of Chinese L2 education in contributing to sustainable economic growth and intercultural dialogue in the African context.

The integration of Artificial Intelligence (AI) with language learning signifies a transformative shift in pedagogical methodologies. Within the domains of AI and Machine Learning (ML), language models exemplify the substantial progress achieved through deep learning techniques (Mizumoto & Eguchi, 2023). OpenAI's ChatGPT stands as a prime example of this progress. Fundamentally, ChatGPT serves as a text generation tool. Utilizing extensive datasets, it is capable of producing content spanning a multitude of topics and styles. Compared to its predecessors, ChatGPT demonstrates an enhanced contextual understanding, yielding more coherent, extensive, and context-specific responses. Its multilingual capabilities facilitate text creation in various languages, thereby augmenting its versatility. Consequently, ChatGPT emerges as an ideal tool for tasks such as language learning, encompassing reading and writing.

This paper aims to explore the role of language learning, specifically second language acquisition, within the context of the SDGs. It seeks to understand how language education can be effectively aligned with the goals of sustainable development, particularly focusing on the impact of technological advancements like AI in enhancing language learning outcomes in Africa. The discussion will delve into how smart technologies, such as AI-driven language learning tools, can contribute to achieving the SDGs, while also considering the ethical implications and challenges associated with their use.

In pursuit of these objectives, the study addresses the following key questions:

> RQ1: How does the use of ChatGPT impact the proficiency of Chinese L2 writing among students in Africa?
>
> RQ2: What are the perceptions of African students regarding the use of ChatGPT for Chinese L2 writing?
>
> RQ3: What challenges do students and educators face when integrating AI into L2 education in African settings?

2. Literature Review

In the domain of second language acquisition, contemporary advancements in Artificial Intelligence (AI) build upon the foundational principles of Intelligent Computer-Assisted Language Learning (ICALL). Studies indicate that AI notably enhances second language learning by augmenting learners' linguistic proficiencies (Chang et al., 2022). Barrot (2023) explored the potential advantages and challenges of using ChatGPT for L2 writing. He argued that ChatGPT provides extensive assistance in writing, generating typically coherent and grammatically accurate texts, making it a valuable tool for learners to refine their writing. However, Barrot strongly recommended using ChatGPT as a supplementary writing tool rather than relying on it solely. A beneficial approach would be to encourage students to produce their initial output and then refine it with ChatGPT. This method aids learners in developing their writing skills while leveraging ChatGPT to enhance their written output. In a mixed-method study conducted by Rad et al. (2023), 46 advanced English learners were evaluated using the Wordtune application. These students

were evenly split into control and experimental groups. Notably, the experimental group, which utilized the Wordtune AI tool, demonstrated marked improvements in their writing, engagement, and feedback skills when juxtaposed with the control group. Furthermore, students commended Wordtune, asserting it bolstered their writing proficiency and engagement levels. In a related study, Gayed et al. (2022) incorporated adult EFL participants in a counterbalanced experiment to assess the efficacy of AI KAKU in enhancing student composition. Initial results indicate that AI KAKU might offer English students more structured support than conventional word processing software. From the perspective of English teachers, Marzuki et al. (2023) examined various AI writing tools and their impact on student writing quality. The research found that integrating AI writing tools can enhance the writing quality of English students. Teachers unanimously believed that AI writing tools played a positive role in improving the clarity and logic of student writing. However, concerns were raised about students possibly becoming overly dependent on these tools, potentially inhibiting their critical thinking and problem-solving abilities.

In the field of Chinese L2 writing and ChatGPT integration, Li et al. (2023) investigated the application of ChatGPT as an instructional tool in three Chinese language courses, providing feedback from instructors. They reported that ChatGPT enhanced the learning experience by offering flexibility, timely responses, and a wealth of information. In a related study, Li et al. (2023) examined ChatGPT's potential in supporting and improving the writing skills of native English speakers learning Chinese. This study, which involved four learners, found that ChatGPT was instrumental in correcting errors and promoting the development of complete sentence structures, resulting in significant improvements in each participant's Chinese writing scores.

This study addresses three critical gaps in the existing literature on AI-assisted language learning, underscoring its significance in the context of the Sustainable Development Goals (SDGs) and the evolving educational landscape in Africa:

(1) Lack of Focused Research on AI in Language Education in Africa: The majority of existing research on AI in education has been centered on developed countries, leaving a substantial gap in understanding how AI tools like ChatGPT can be effectively implemented in the African educational context. Africa's unique educational challenges and opportunities necessitate a tailored approach to integrating AI into language learning. This study contributes to filling this gap by exploring the implementation of ChatGPT in enhancing Chinese L2 proficiency, providing insights that could inform policy and practice in African educational settings. It aligns with SDG 4, advocating for inclusive and equitable quality education, and promotes lifelong learning opportunities across diverse educational landscapes.

(2) Insufficient Exploration of AI's Role in Chinese L2 Learning: There is a noticeable scarcity of research on the impact of AI tools on learning Chinese as a second language, especially compared to more commonly studied languages like English. This study seeks to bridge this gap by specifically focusing on the application of ChatGPT in Chinese L2 learning. The findings from this research could significantly contribute to understanding the potential of AI in diversifying language education and promoting linguistic inclusivity, essential components in achieving the broad goals of sustainable education.

(3) Under-representation of African Perspectives in AI-assisted Language Learning: The under-representation of African perspectives in existing literature on AI-assisted language learning limits the understanding of how these technologies can be adapted and utilized in African educational and cultural contexts. By focusing on African learners and educators, this research offers a valuable addition to the literature, showcasing how AI tools like ChatGPT can be tailored to meet the specific needs and contexts of African countries. This approach is crucial for ensuring that the benefits of technological advancements in education are equitably distributed and culturally relevant.

In conclusion, this research not only addresses key gaps in the current understanding of AI's role in language learning but also contributes to the ongoing discourse on sustainable education in Africa. It provides practical insights into how Artificial Intelligence like ChatGPT can be harnessed to enhance language learning, thereby supporting the achievement of SDGs and fostering educational advancements in diverse global contexts.

3. Methodology

3.1 Participants

The study comprised a total of 46 participants, recruited from a public university located in Cape Verde. The participant group consisted of 20 male and 26 female subjects, reflecting a diverse gender representation. All participants were native speakers of Cape Verdean Creole and were engaged in learning Chinese as a second language. Regarding their proficiency in the Chinese language, all participants were assessed based on the criteria set by The Common European Framework of Reference for Languages. The proficiency levels of the participants were determined to be within the B1 to B2 range. This range indicates that they had surpassed basic language skills and were developing towards an independent level of language use, making them a suitable cohort for studying the efficacy of AI tools in enhancing intermediate-level language skills.

It is important to note that the involvement of all participants in this study was entirely voluntary. Ethical considerations were meticulously adhered to, ensuring that each participant was fully informed about the nature of the study, the procedures involved, and their rights as participants, including the right to confidentiality and withdrawal. Informed consent was obtained from each participant before the commencement of the study, aligning with the ethical guidelines and standards of academic research.

3.2 Procedure

The study was conducted in several steps. Initially, participants received reading materials, with 30 minutes for reading. Subsequently, they were acquainted with the rules and proceeded to create

their initial continuation pieces based on the reading material. Next, these writings, alongside the reading material and specific continuation requirements, were fed into the ChatGPT platform. This enabled ChatGPT to generate subsequent content. Participants then crafted their second continuation writings, drawing inspiration from ChatGPT's output. The sixth phase involved evaluating the two sets of continuation writings for Complexity, Accuracy, and Fluency. Finally, 12 participants were chosen for semi-structured interviews to delve into their writing experiences. As demonstrated in Figure 1.

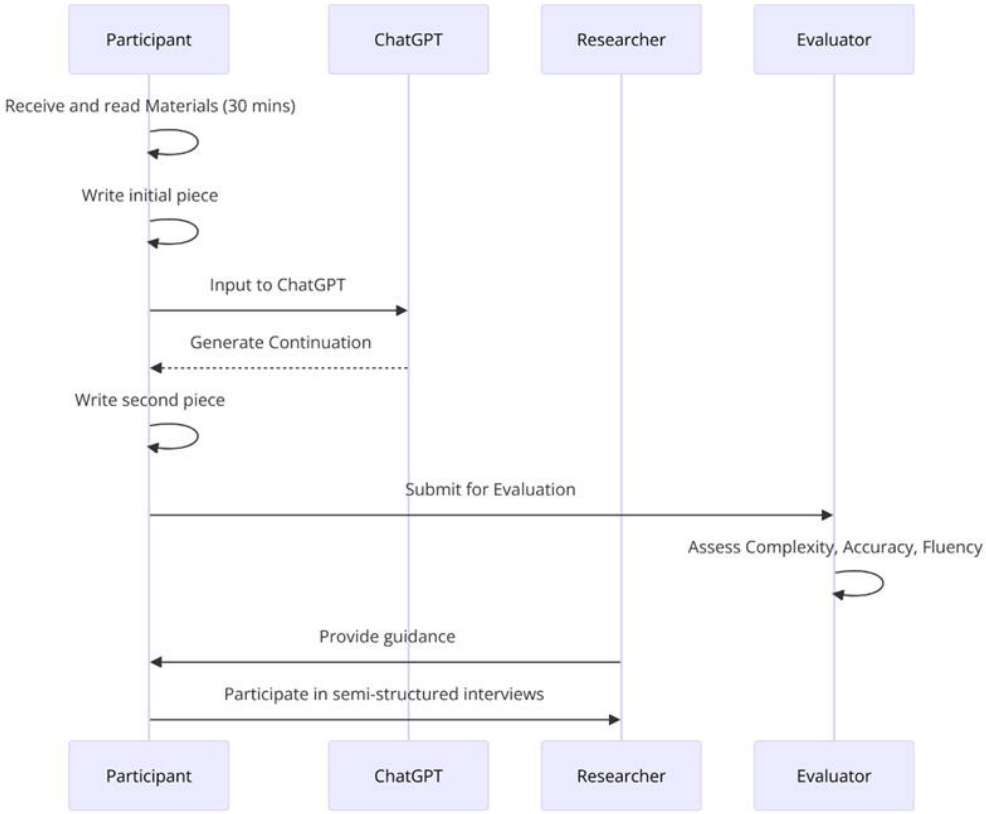

Figure 1: Research process flowchart.

To reduce the challenges associated with writing Chinese characters, participants were encouraged to type on computers. This allowed them to concentrate on the cognitive aspect of writing, without being hindered by the complexity of Chinese characters.

3.3 Instruments

3.3.1 Writing Materials

For this study, reading materials were obtained from practice sets designed for Chinese proficiency tests. These materials were then categorized according to the participants' proficiency levels in Chinese. Selection criteria for these materials included their engaging character, appealing content, and the facility with which they could be imitated and extended.

3.3.2 Evaluation Indicators

Recently, the metrics of Complexity, Accuracy, and Fluency (CAF) have emerged as pivotal tools for assessing second language (L2) writing proficiency (Biber, Gray, & Poonpon, 2011; Phuoc & Barrot, 2022). Studies indicate that CAF metrics provide an in-depth and impartial assessment of learners' writing abilities (Riadil, 2019; Fathi & Rahimi, 2022; Yang & Kim, 2020). The application of the CAF framework enables students to craft texts that are detailed, precise, and fluid (Barrot, 2023).

The current study employed the T-unit as a measure to gauge language complexity, accuracy, and fluency. Defined by Hunt (1966), a T-unit is the smallest unit of grammar, consisting of a main clause and any associated structures. A clause comprises a subject and a predicate. We assessed syntactic complexity through the C/T ratio, which calculates the total number of clauses divided by the total T-unit count. A higher C/T ratio signifies greater sentence complexity. The formula used for syntactic complexity is: "total clauses ÷ total T-units" （Wolfe-Quintero et al., 1998, pp. 129-135）. Lexical complexity was gauged based on the Chinese Proficiency Grading Standards for International Chinese Language Education, with a focus on intermediate vocabulary usage in the composition. Accuracy was quantified via the EFT/T ratio, reflecting the proportion of error-free T-units to the overall T-unit count. The accuracy formula is: "error-free T-units ÷ total T-units" (Polio, 1997). For fluency, the study utilized the W/T ratio, which determines the total word count about the combined sum of T-units and clauses. The fluency formula is: "total words ÷ (total T-units + total clauses)".

Table 1. Evaluation Indicators

Dimensions	Evaluation methods
Syntactic Complexity	Clauses/T-unit
Lexical Complexity	Intermediate Vocabulary Number
Accuracy	Error-free T-unit/T-unit
Fluency	Words/T-unit+ clauses

3.3.3 Semi-structured interview

For the semi-structured interviews in this study, 12 participants were carefully selected from the broader cohort of 46, based on a balanced gender distribution from the group of 6 male and 6 female students. Priority was given to those who demonstrated notable engagement and motivation in learning Chinese as a second language, as well as some prior exposure to AI language learning tools. This selection strategy aimed to capture diverse, informed perspectives while adhering to ethical standards of voluntary participation and informed consent.

To ensure confidentiality, participants were coded as T1, T2, T3, T4, T5, T6, T7,T8, T9,T10, T11,T12,To ensure a deeper understanding by the learners, the interviews were conducted in both Chinese and English. The researchers did not disclose the research hypotheses to the interviewees.

Interviews took place in the university cafeteria and teacher offices. No specific environment was set up for the interview to ensure participants did not feel constrained and could answer sincerely and freely. After obtaining the participant's consent, the entire interview was recorded using a voice recorder.

3.4 Data analysis

Owing to the lack of online tools for analyzing Chinese texts, two evaluators (Two native Chinese speakers, and Chinese teachers) and a Chinese language professor manually conducted the quantitative data analysis. Reliability was ensured by employing data triangulation techniques. In the qualitative phase, grounded theory methodology was applied to scrutinize the data. The recorded interviews were meticulously transcribed verbatim into Microsoft Word documents. Participants were solicited to confirm the information, thereby guaranteeing the transcription accuracy. After collecting feedback from participants, a thematic analysis of the interview outcomes was conducted to tackle the research inquiries. For objectivity assurance, two evaluators independently encoded the data. In instances of discrepancies and lack of consensus, the third evaluator, a language professor with vast teaching and research expertise, adjudicated the final data.

4. Results

4.1 Quantitative phase

Table 2. Evaluation of the Continuation writing

Dimensions	First Continuation (Mean ±SD)	Second Continuation (Mean ±SD)	t-Value	p-Value
Syntactic Complexity	2.40±0.71	2.90±0.77	-4.53	0.043*
Lexical Complexity	10.00±1.10	15.00±1.22	-5.66	0.008*
Accuracy	0.20±0.22	0.85±0.26	-6.78	0.002*
Fluency	10.73±1.22	11.50±1.34	-3.92	0.017*

**p < .05*

In our quantitative analysis of Chinese L2 writing improvements, we conducted a comprehensive evaluation across four dimensions: Syntactic Complexity, Lexical Complexity, Accuracy, and Fluency. This evaluation involved 46 participants (n=46), with findings reported as mean values accompanied by standard deviations (Mean ± SD) for both the first and second continuations. To assess the significance of improvements observed from the first to the second continuation, we

employed paired sample t-tests for each dimension, providing a statistical basis for evaluating mean differences.

The results indicated a statistically significant improvement in Syntactic Complexity, with the mean score increasing from 2.40±0.71 in the first continuation to 2.90±0.77 in the second ($t(45) = -4.53$, $p < .05$). Similarly, Lexical Complexity showed a significant enhancement, rising from 10.00±1.10 to 15.00±1.22 ($t(45) = -5.66$, $p < .05$). For Accuracy, the mean score improved substantially from 0.20±0.22 to 0.85±0.26, also reflecting a statistically significant change ($t(45) = -6.78$, $p < .05$). Lastly, the Fluency dimension demonstrated a significant growth, with the mean score advancing from 10.73±1.22 to 11.50±1.34 ($t(45) = -3.92$, $p < .05$).

These statistical analyses underscore the significant improvements made in all dimensions of Chinese L2 writing proficiency among the participants, attributing a robust quantitative foundation to the observed enhancements. Overall, the data from this study reveal a positive trend in all the assessed dimensions of continuation writing, suggesting that ChatGPT positively influences the complexity, accuracy, and fluency in the writing of Chinese L2 learners.

4.2 Qualitative Phase

4.2.1 Positive Themes:

Augmented Confidence in Chinese Composition: Initially skeptical, several participants reported a marked increase in their confidence in writing Chinese following their engagement with ChatGPT for Continuation writing.

"When I first tried ChatGPT, I felt daunted and uncertain. Every new tool brings its challenges and uncertainties. But as I explored further, I discovered it wasn't merely a tool but also an inspiration for writing and a boost to my confidence. Engaging with ChatGPT aided me in structuring my thoughts, broadening my horizons, and reigniting my writing enthusiasm." (T2)

Increased Classroom Efficiency: Several participants noted that the promptness of ChatGPT's responses resulted in significant classroom time savings.

"Within the same timeframe, I completed two additional writing assignments, enhancing my learning efficiency in the class." (T3)

Assistance in Grammar and Vocabulary: The content and vocabulary provided by ChatGPT served as a model for several participants, prompting them to enhance the quality of their writing.

"Whenever I faced writer's block, ChatGPT provided valuable insights on sentence construction and appropriate word choices." (T4)

"I often find myself adopting the sentence patterns and vocabulary suggested by ChatGPT in my writings." (T5)

4.2.2 Negative Theme:

The Absence of Empathy in ChatGPT and the Invaluable Role of Human Educators: Responses highlighted that, despite ChatGPT's ability to produce responses from a vast database, it fails to exhibit authentic emotions or lived experiences. Within dialogues that delve into profound cultural

or emotional depths, the empathetic understanding and emotional depth provided by human educators remain unparalleled.

"While teachers' roles might change, they will never become obsolete. Tools like ChatGPT can facilitate quick knowledge acquisition and address rudimentary queries, but profound learning, critical thinking, and social skills invariably require human intervention". (T1)

"Technology is a powerful adjunct, but it falls short of replicating authentic human connections and profound understanding". (T10)

"Every learner is unique, with distinct learning preferences and needs. These subtle variances pose challenges for machine learning algorithms. Genuine education extends beyond mere knowledge transfer to encompass emotional interactions, motivation, and encouragement". (T8)

4.2.3 Challenges

On the difficulty with internet conditions:

"To be honest, the internet situation here is really bad. Most of the time, we're struggling to find a stable internet connection, which is a huge barrier to learning. Sometimes, we can't even attend online classes or access online resources. It's not just a minor issue; it severely affects our learning efficiency and motivation. Talking about digital learning or online education in this environment feels like discussing a far-fetched dream." (T9)

On the challenge of economic conditions:

"Another major issue is that most students here are struggling with poverty. We don't have enough funds to purchase essential learning tools, like computers or smartphones. Even if we manage to get online, we lack the devices to fully utilize these resources. This state of poverty means we are hard-pressed to keep up with students from other regions. I feel that talking about high-quality education without the right tools and resources is futile." (T6,T7)

On the lack of teachers' awareness of AI-assisted learning:

"I've also noticed that many teachers lack awareness of AI-assisted learning. They either don't understand these technologies or are not interested in adopting these new tools. This leads to our learning methods being very traditional, lacking innovation and efficiency. Elsewhere, AI and technology are transforming the way education is delivered, but here, that shift seems yet to start. Our education system needs to catch up with the times, utilizing AI to enhance the learning experience and outcomes." (T9,T11,T12)

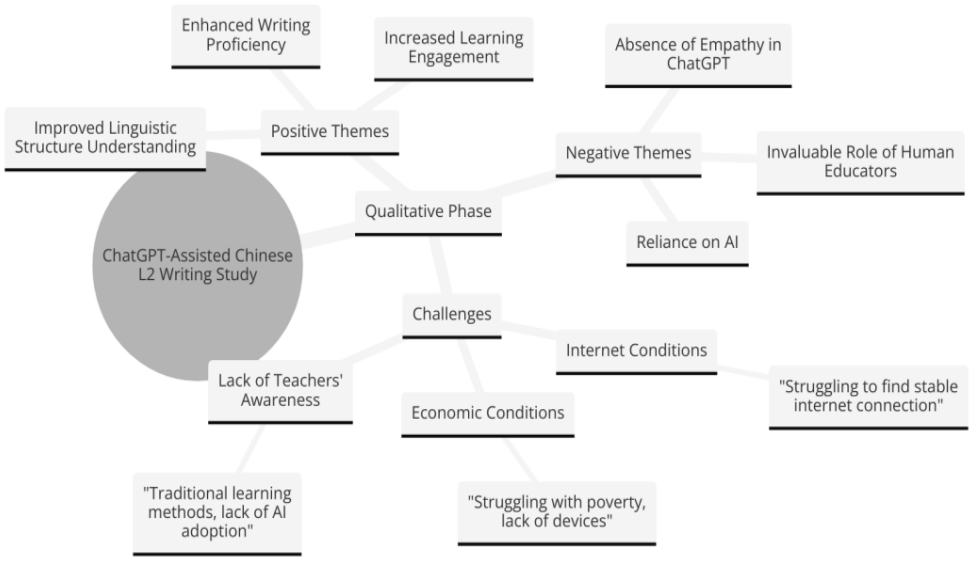

Figure 2. Thematic map of the interview.

5. Discussion

5.1 Impact of ChatGPT in Chinese L2 Continuation Writing Task

Conversation is the most fundamental and natural way humans utilize language, revealing underlying mechanisms of language use. To explore this mechanism, Pickering and Garrod (2004) proposed the interactive alignment model. A crucial aspect of this model is that linguistic alignment occurs through structural priming, where individuals tend to repeat the language structures they or others have used or been exposed to (Bock, 1986). Reading and then writing a continuation is a form of interaction between a person and the text, where learners, during the continuation process, can refer back to and borrow the language from the text if they wish to express similar situational plots, learning the correct use of language involved in the context through interaction between understanding and output, fostering a collaborative effect. Weaker output abilities are continually enhanced in collaboration with comprehension abilities.

The traditional L2 Continuation Writing Task follows a learning process of "interaction → understanding→collaboration→output→acquisition." With the introduction of ChatGPT into the L2 Continuation Writing Task, the learner's process becomes "interaction→understanding→ collaboration→output→ChatGPT intervention→re-understanding→re-collaboration→re-output → improved acquisition." In this process, ChatGPT's role is manifested in three aspects: 1) ChatGPT sets up multiple rounds of continuation writing, which helps enhance students' interaction with the reading material (including content generated by ChatGPT), promoting students to reread the material repeatedly, strengthening the intensity of interaction after reading and writing, and unleashing its learning potential. This finding is consistent with previous research by Miao and Wang (2022). 2) ChatGPT introduces scenario-based guidance. L2 Continuation Writing Task is an open-ended writing task, emphasizing the learner's creativity and imagination. Therefore, the continuation plots by different learners often vary significantly, resulting in varying strengths of

connection between the pre-reading and subsequent content, and failing to maximize the intensity of collaboration. ChatGPT approaches from scenarios, driving linguistic collaboration through scenario alignment. ChatGPT's intervention can recreate the context and plots of the previous text, offering more opportunities for previous language use and providing similar contextual experiences for the use of linguistic structures. This not only strengthens the memory effect of the L2 structures but also increases the likelihood of using correct sentences under new communicative needs. 3) Using ChatGPT for L2 Continuation Writing Task can generate complex continuations within a shorter and more efficient timeframe, greatly improving the efficiency of the continuation task compared to traditional handwriting or editing processes. Moreover, ChatGPT not only accelerates the speed of writing but also ensures the high quality of the generated text, including narrative coherence, language diversity, and content innovation, which are advantages unmatched by traditional foreign language writing exercises. Consequently, it is more accurate to conceptualize the learning process within our study as a triadic interaction involving ChatGPT, instructors, and students. This collaborative model leverages ChatGPT's technological capabilities to generate content that engages students, while instructors assume an essential intermediary role. They adapt the AI-generated material to fit educational objectives, ensuring that it is pedagogically appropriate. Students interact with both the original texts and the AI-enhanced continuations, contributing their unique interpretations and further continuations to the learning activity. Thus, this process represents a cohesive interaction where technology, guided by pedagogical expertise, significantly enriches the educational experience by fostering an environment conducive to active learning and creativity.

5.2 African Learners' Perceptions of ChatGPT in Chinese L2 Writing

The semi-structured interviews with African students and educators offered valuable insights into the perceptions of using ChatGPT for learning Chinese as a second language. The overall sentiment was predominantly positive, with the majority of participants recognizing ChatGPT as a beneficial tool for language learning. This positivity stemmed primarily from ChatGPT's ability to provide immediate, relevant feedback, enhancing the interactivity and engagement of the learning experience. Additionally, the flexibility offered by ChatGPT, allowing for personalized learning paces and styles, was highly appreciated. Despite these positive aspects, there were concerns about a potential over-reliance on technology. Some participants feared that excessive dependence on AI tools like ChatGPT could hinder the development of independent language skills. Nonetheless, the consensus leaned towards viewing ChatGPT as a valuable supplement to traditional language learning methods, capable of significantly enhancing the educational process. Delving into specific themes from the interviews, several key patterns emerged. A notable theme was the augmented confidence in Chinese composition among students. Initially apprehensive about using AI tools, many participants reported a substantial increase in their confidence following their engagement with ChatGPT. This boost in confidence was attributed not just to the assistance in writing tasks but also to an expanded understanding of Chinese linguistic structures facilitated by the tool. Moreover, increased classroom efficiency was another significant theme identified. Both educators and students noted that ChatGPT's prompt and relevant responses enabled more efficient use of classroom time. This efficiency was particularly beneficial. In resource-constrained educational environments where optimizing classroom time is crucial. Furthermore, the assistance provided by ChatGPT in grammar and vocabulary was highlighted as

a crucial factor in enhancing the quality of students' written Chinese. Participants frequently cited the tool's suggestions for sentence construction and word choice as instrumental in improving their linguistic capabilities, leading to more advanced and sophisticated language usage.

In summary, the findings from our qualitative analysis underscore the multi-faceted impact of ChatGPT on Chinese L2 writing. While the tool is largely seen as beneficial in enhancing writing proficiency and learning efficiency, it also raises important considerations about the balance between technology reliance and the development of independent language skills. These insights are instrumental in understanding the potential and limitations of AI tools in language education, particularly in the diverse and dynamic educational landscape of Africa.

6. Conclusion

This study explores the impact of ChatGPT, an AI tool, on enhancing Chinese L2 writing proficiency among students in Africa, and its alignment with the United Nations' Sustainable Development Goals (SDGs). Utilizing a mixed-methods approach, the research examined the effectiveness of ChatGPT in improving language skills and addressed the broader implications for quality education (SDG 4) and reducing inequalities (SDG 10) in African educational contexts.

The quantitative phase involved 46 participants, assessing improvements in syn-tactic complexity, lexical complexity, accuracy, and fluency. Results indicated significant enhancements in these areas, underscoring ChatGPT's potential in language education. The qualitative phase, through semi-structured interviews, revealed positive themes including increased confidence in Chinese composition, improved classroom efficiency, and enhanced grammar and vocabulary skills. However, it also highlighted challenges such as technological barriers, economic constraints, and a lack of educators' awareness of AI-assisted learning tools. The study concludes that while ChatGPT presents significant benefits in language learning, addressing infrastructural and pedagogical challenges is crucial for its effective integration. Recommendations include enhancing internet connectivity, providing cost-effective AI solutions, and training educators in AI utilization. This research contributes to the understanding of AI's role in language education and its potential in achieving sustainable educational development in diverse global contexts.

There are limitations to consider. As the textual modes theory points out, different types of text tasks possess varying levels of difficulty. Our study focused on the impact of ChatGPT on writing outcomes but did not account for the influence of different texts on continuation writing. This might not comprehensively demonstrate ChatGPT's full effect on student writing quality. Future research could delve into the impact of AI on various texts and the long-term effects on student writing skills, offering a more comprehensive understanding of the pros and cons associated with using AI writing tools in second-language classrooms.

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