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Integration of Artificial Intelligence to Strengthen Critical Thinking in Teacher Training

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Abstract. Critical thinking is fundamental to higher education, empowering future educators to critically analyze and reflect upon the complex socio-cultural settings that shape their professional practice. However, limited empirical evidence explains how generative AI-supported pedagogical resources contribute to critical thinking development in English as a foreign language (EFL) teacher training, particularly in Latin American higher education contexts. In this context, the purpose of the present research was to determine the impact of generative artificial intelligence (AI) on the development of critical thinking in 163 final-year students of a teaching English as a foreign language program at a private university in Ecuador. A mixed-methods, quasi-experimental approach was used, employing diagnostic and perception questionnaires, pre-tests, post-tests, and a semi-structured interview. A 14-week pedagogical intervention was conducted, integrating AI-supported teaching resources such as ChatGPT, Canva, Copilot, Gemini, Invideo, and Leonardo AI. Simultaneously, activities involving the critical and reflective analysis of texts related to current social issues were developed. The findings indicate that integrating generative AI enhances the critical and reflective competencies of pre-service English teachers, particularly in discourse analysis, sociocultural awareness, and facilitating discussions on socially significant issues. This study concludes that, when pedagogically guided, generative AI can strengthen critical thinking in EFL teacher training by supporting discourse analysis, reflective inquiry, and the interpretation of social matters. Its contribution lies in demonstrating that multiple AI-generated resources can serve as pedagogical supports to strengthen analytical and reflective competencies in EFL teacher training.

Keywords: Higher education; English teaching; artificial intelligence; critical thinking

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1. Introduction

In the current academic landscape, generative artificial intelligence (AI) is an essential tool for training the next generation of teachers, fostering innovation in pedagogical development. In this sense, AI resources offer numerous opportunities to adapt educational materials and personalize them to the needs of each student (Kroff et al., 2024; Vera, 2023). Among the main advantages that generative AI offers in the educational field are the ease of content creation, the personalization of learning experiences, and real-time feedback, which allows for education that responds to students' requirements. Al-Tkhayneh et al. (2023) stated that the use of AI strengthens the learning process and streamlines task management, also constituting valuable support in language teaching (Risueño Calahorrano & Torres Andrango, 2024; Vicente-Yagüe-Jara et al., 2023).

Generative AI fosters critical thinking during teacher training. Mellado-Moreno et al. (2024) pointed out that critical thinking involves analysing, evaluating, and synthesizing information logically, objectively, and reflectively. This requires an active and conscious attitude from students in order to understand the elements that give rise to a situation or problem by formulating questions that challenge existing knowledge. Furthermore, Loáiciga Gutiérrez et al. (2024) stated that strengthening critical thinking skills is one of the most important challenges in education. Mosqueda (2024) affirmed that one of the advantages of AI is the generation of more efficient learning environments and highlighted the need to encourage analytical skills to prepare new generations for the challenges of global society. Therefore, the effective use of AI contributes to the development of critical thinking, because it strengthens analysis, stimulates autonomous problem-solving, and allows students to access diverse information resources (Marín et al., 2024).

Several studies have analysed how AI contributes to stimulating critical thinking in university settings. Alpizar and Martínez (2024) investigated students' perceptions of the implementation of generative AI to improve their learning. In this context, they analysed data on the impact of this technology on the educational process and studied factors such as motivation, creativity, and critical thinking. Utilizing a quantitative approach and a descriptive design, Alpizar and Martínez (2024) revealed that students highly value innovative technologies for their ability to facilitate a deeper mastery of course content. Thus, the challenges related to the implementation of AI were identified, and its importance in addressing the characteristics of each teaching environment was highlighted. Furthermore, Menacho et al. (2024) observed the influence of AI on the autonomous learning of university students.

For this study, 65 scientific articles indexed in Scopus were considered using the Pro.Seso Creativo 3.0 methodology. The results revealed that most students recognize AI as essential for optimizing academic information searches. This work highlights the importance of the ethical and responsible use of AI tools in higher education. It was concluded that, when applied using appropriate strategies, AI fosters autonomous learning.

Similarly, Sanabria-Navarro et al. (2023) examined the influence of AI on contemporary education through a mixed-methods systematic review. Adhering to the PRISMA methodology, they synthesized 4,097 articles from Scopus, Mendeley, and ScienceDirect to provide a comprehensive quantitative and qualitative overview. The results revealed that AI offers personalized educational solutions and improves student learning. Furthermore, Pokrivcakova (2024) examined the attitudes of prospective English as a foreign language (EFL) teachers toward the implementation of AI and its integration into teaching in Slovakia. Through a cross-sectional survey based on the knowledge, attitude, and practice model, it was found that most participants lacked knowledge about the computational principles of AI but they valued its educational advantages. Pokrivcakova (2024) showed that, although opinions about the use of AI in the classroom were mostly positive, there were some concerns about the limited improvement in teaching skills and the reduction of personalized teaching.

Within this context, it is evident that generative AI constitutes a transformative innovation in contemporary pedagogical processes, not merely due to its technological sophistication but because of its capacity to mediate and enrich cognitive and metacognitive learning experiences. Grounded in sociocultural learning theory, the present study views generative AI as a pedagogical support that, when guided by purposeful instructional design, can foster discourse analysis, perspective comparison, questioning, and reflection on socially relevant topics. Although previous studies have reported positive perceptions of AI in higher education and its potential to support autonomous learning, motivation, and educational innovation, much of this evidence remains general and does not explain how generative AI can be pedagogically integrated to strengthen critical thinking in EFL teacher training.

Moreover, limited empirical attention has been given to pre-service English teachers in Latin American contexts, in which access, digital familiarity, and pedagogical mediation may influence the effectiveness of AI-supported learning. Therefore, this study addresses this gap by considering future EFL educators' perceptions of AI and examining how a structured pedagogical intervention using several generative AI tools can contribute to their analytical reasoning, reflective inquiry, and discourse analysis. Accordingly, the current study investigated the impact of generative AI on the critical skills of future EFL educators by addressing the following research questions:

- RQ1:** How do students perceive the integration of generative AI in their learning process, and to what extent do these perceptions relate to the development of their analytical and critical thinking skills?
- RQ2:** To what extent do participants strengthen their critical thinking skills through the use of generative AI tools in the course?

2. Literature Review

2.1 Critical Thinking and Its Impact on Learning

Critical thinking has been conceptualized as a set of cognitive and intellectual skills that enable individuals to analyze information, evaluate arguments, and make evidence-based decisions (Mellado-Moreno et al., 2024). This implies an understanding that knowledge is subject to debate, because it allows for the substantiation of arguments through the presentation of solid evidence (Alsaleh, 2020). In this context, Mellado-Moreno et al. (2024) defined critical thinking as a reflective process aimed at deciding what to believe or what to do, highlighting dimensions such as logical reasoning, inference, source evaluation, and self-regulation. In a similar manner, Facione (2023) asserted that critical thinking involves specific skills such as interpretation, analysis, evaluation, inference, and explanation, which are crucial in educational research. These perspectives frame critical thinking not only as an isolated skill but as a complex competence that integrates metacognitive processes oriented toward the active construction of knowledge.

In technology-integrated EFL instruction, critical thinking is intrinsically tied to students' capacity to process multimodal information, critically appraise digital content, and engage meaningfully in technology-mediated learning environments. Loáiciga Gutiérrez et al. (2024) emphasized that the development of critical thinking requires educational environments that promote questioning, analysis of perspectives, and guided metacognitive reflection— aspects that can be enhanced through the pedagogical use of emerging technologies. Likewise, from a sociocultural perspective, technological mediation can act as cognitive scaffolding that fosters the construction of meaning and the development of higher-order thinking skills (Hong et al., 2025), especially when digital tools are integrated through intentional pedagogical strategies.

In this regard, generative AI offers new possibilities for stimulating processes of analysis, argumentation, and critical reflection, provided that its implementation is based on instructional designs that promote meaningful learning. Therefore, it is necessary to implement new teaching strategies that strengthen students' critical thinking skills, enabling them to reason with greater depth, coherence, and creativity (Gutiérrez et al., 2024). This, in turn, strengthens students' cognitive and metacognitive abilities (Saz-Pérez & Pizà-Mir, 2024).

2.2 Use of Generative AI in Teacher Training

The integration of generative AI within higher education offers transformative potential for training future EFL educators; however, this shift also introduces significant pedagogical and ethical challenges (Acosta, 2023; Vera, 2023). In this area, numerous AI applications enable content creation, providing users with learning resources tailored to their needs (Peñaherrera Acurio et al., 2022). Consequently, AI enriches the educational experience and fosters the development of versatile educators who are attuned to the pedagogical potential of technology and equipped to meet the dynamic needs of modern learners (Suchánová, 2023). The integration of AI in teaching fosters pedagogical innovation, offering alternatives to strengthen teacher training, autonomous

learning, and access to resources and information (Díaz Ramírez & Díaz Ramírez, 2024).

Furthermore, the development of pedagogical and critical competencies in teacher training requires the responsible use of generative AI. Recent studies indicate that AI tools can support instructional planning, the generation of educational materials, and formative feedback, thus expanding opportunities for future teachers to experiment with innovative, student-centered pedagogical strategies (Kasneci et al., 2023). Additionally, the use of AI in higher education should not be limited to task automation but should be geared toward strengthening critical thinking, digital literacy, and ethical reflection on the use of data in educational contexts (Farrelly & Baker, 2023; Tlili et al., 2023). Teacher training programs need to incorporate pedagogical approaches that promote not only the technical adoption of AI but also the ability of future teachers to critically evaluate its applications, understand its limitations, and design learning experiences that integrate these tools in an ethical, pedagogically rigorous framework, oriented towards the holistic development of students.

Although generative AI offers pedagogical opportunities, its use also raises concerns about bias, inaccurate information, academic integrity, over-reliance, and unequal digital access. In this study, multimodal generation supported key critical thinking skills, including discourse comprehension, questioning, inference, argument evaluation, reflection, and self-regulation. Thus, generative AI was approached as a pedagogically guided support for analytical and reflective development.

3. Methodology

3.1 Design

This study employed mixed methods, quasi-experimental research design, combining quantitative and qualitative analysis to gain a deeper understanding of the phenomenon under investigation (Creswell & Creswell, 2017). As Ramos (2021) suggested, a quasi-experimental framework is well-suited for studying existing groups. In this study, the methodology allowed for an assessment of generative AI's impact on the critical thinking competencies of the participating university students. Although this study followed a quasi-experimental logic using pre- and post-intervention measurements with an existing group, the absence of a control group may limit causal inference; therefore, the findings are interpreted as improvements associated with the intervention, while recognizing other possible contributing factors.

3.2 Participants

The participants included 163 seniors enrolled in a teaching English as a foreign language program at a private university in southern Ecuador. Informed consent was obtained from all students prior to the study. They were also informed that AI-supported resources would be used for academic purposes, and no sensitive personal data would be entered into generative AI platforms. Of the participants, 73% were female, and 27% were male. The majority were young adults between 23 and 27 years of age, from the coastal, highland, and Amazonian regions of the

country. The participants' proficiency level was B2 according to the Common European Framework of Reference for Languages. A total of 108 students were enrolled in a semantics and pragmatics course and 55 in a discourse analysis course through the online learning system. Convenience sampling was chosen due to its ease of access and relevance to the study's objectives.

3.3 Strategies and Instruments

The following data collection instruments and procedures were used to address the research objectives:

- A **diagnostic questionnaire** with 10 closed-ended questions was used to explore students' prior experience using AI tools. This identified participants' perceptions of their critical analysis skills.
- A **pretest** was administered to assess participants' ability to analyze and critically reflect on a current political discourse. This included an activity that involved analysing a text, identifying main ideas, evaluating arguments, and reflecting critically.
- A **perceptions questionnaire** with 12 closed-ended questions was used to identify students' opinions about the influence of generative AI on their analytical and reflective skills. Section 1 of the questionnaire explored perceptions of AI use in learning and its influence on motivation, understanding of complex concepts, and feedback. Section 2 focused on the impact of AI on the development of critical thinking and included aspects related to strengthening skills such as evaluating arguments, analysing ideas, and formulating questions. Section 3 determined perspectives regarding the use of AI to identify relevant information, strengthen reflective capacity, and engage in planned activities.
- A **post-test** replicated the core characteristics and assessment criteria of the initial pre-test, in order to ensure comparability.
- **Semi-structured interviews**, featuring five open-ended questions, were conducted to elicit deeper insights into participants' perceptions of AI integration and its influence on their analytical skills.

Questionnaires and tests allowed for the evaluation of the quantitative effects of the intervention and the students' subjective perceptions. It is important to note that all instruments used were piloted and validated before their final application to ensure their relevance to the study. Subsequently, their internal consistency was assessed, yielding a Cronbach's alpha coefficient of 0.74.

3.4 Procedure

The research was conducted over a 14-week period across three phases, beginning with a diagnostic phase aimed at assessing the participants' familiarity with AI tools in EFL contexts and their critical thinking abilities. A pretest was also administered, consisting of the analysis of a current political speech to assess the participants' critical and reflective thinking skills. A rubric was used to evaluate the pretest results and observe aspects related to the identification of main ideas, argument analysis, text evaluation, critical reflection, organization, and clarity.

The second phase involved the intervention, during which activities such as the critical and reflective analysis of texts on various topics of social interest were implemented. For this purpose, various educational resources were used, designed with tools such as Chat GPT, Canva, Copilot, Gemini, Invideo, and Leonardo AI. It is important to mention that these resources included videos, images, concept maps, infographics, summaries, and more, which were shared weekly through academic announcements to ensure continuous and easy access for all participants. Additionally, ongoing feedback was provided during weekly synchronous sessions via Zoom. Asynchronous feedback on student assignments was provided through comments, messages, and discussion forums within the institutional Canvas learning management system.

In the third phase, a questionnaire was administered to assess students' perceptions of their experience using AI-generated resources. A post-test, with the same characteristics as the pre-test, was also administered to evaluate the impact of the intervention. The assessment rubric, previously used in the pre-test, was applied to the post-test to ensure scoring consistency. In addition, the AI-supported activities followed common weekly objectives, teacher-guided prompts, and comparable task sequences across the courses. Finally, semi-structured interviews were conducted with 25 students to gain a deeper understanding of their opinions regarding the implementation of AI in their learning process.

Figure 1 shows the three phases of research that were conducted over a 14-week period.

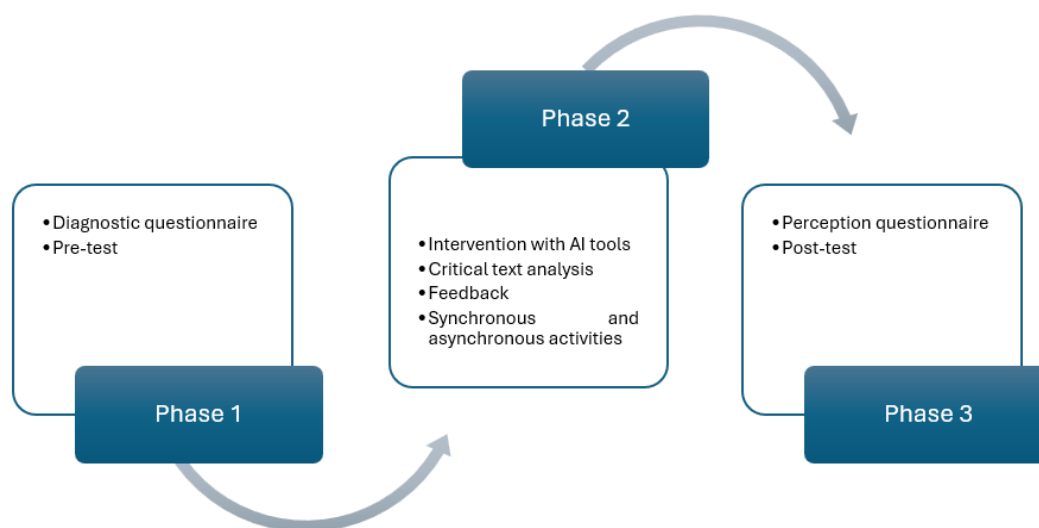


Figure 1: Procedure

3.5 Data Analysis Procedure

To address RQ1, a sequential explanatory mixed-methods design was employed, integrating a perceptions questionnaire with semi-structured interviews. In the quantitative phase, perceptions of generative AI use were analysed using item-level descriptive statistics with Likert-type scales. In the qualitative phase, the interviews were analysed inductively to derive categories of perceived

benefits. Additionally, the frequency of use of relevant terms was analysed and visualized in a word cloud using the Mentimeter tool. The findings were triangulated to explain the observed trends.

Regarding RQ2, the strengthening of critical thinking skills was assessed through the pre-test and post-test using qualitative analysis of the texts written by the participants. Quantitatively, pre- and post-intervention scores were compared using a paired-samples t-test. By evaluating both the increase in assessment scores and the enhanced depth of students' textual reflections, the analysis provided critical data on the overall impact of the intervention.

4. Results

4.1 Diagnostic Questionnaire Results

The results of the diagnostic phase indicated that 90.35% of the students were familiar with AI, demonstrating a basic understanding of this technology. Although 80.65% of participants reported occasionally using AI-based interactive tools for learning English, only 7.30% did so frequently, while 12.05% had never used them. This could suggest that AI had not been explored by all students due to factors such as lack of access, limited knowledge, or a preference for traditional methods.

Furthermore, it was determined that AI tools were primarily used to reinforce participants' language skills, demonstrating that the majority (68%) of students were interested in learning about the potential applications of this technology to improve their communicative competence. Regarding the factors influencing students' decisions to use AI tools, 62.10% expected them to be accessible and easy to use. Furthermore, 44.80% of participants indicated that the cost of accessing AI was also a significant factor in this regard. Finally, the personalization offered by AI was valued as relevant by 34.50% of students, who stated that these tools could be adapted to their specific needs and learning styles.

4.2 Results of the perceptions questionnaire

Regarding the results of the perception survey, Table 1 presents the opinions related to the impact of AI and the participants' experience regarding the use of these tools.

Table 1: Participants' perceptions

Items	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Section 1: Perceptions on the use of generative AI in learning					
The use of generative AI tools increased my motivation and facilitated my learning in this course.	79.75%	20.25%	0.00%	0.00%	0.00%
Using generative AI has helped me understand complex concepts more effectively.	71.79%	19.63%	4.29%	4.29%	0.00%

The use of generative AI has motivated me to explore topics from different perspectives.	71.78%	28.22%	0.00%	0.00%	0.00%
The use of generative AI improved the feedback process received in the course activities.	71.78%	20.25%	7.97%	0.00%	0.00%
Section 2: Impact of generative AI on the development of critical thinking					
The activities supported by AI-generated resources strengthened my ability to evaluate arguments in academic texts and reflect on the topics I studied.	43.56%	28.22%	28.22%	0.00%	0.00%
My ability to analyze problems from multiple points of view has improved thanks to the use of resources designed with AI tools.	65.65%	20.25%	9.81%	4.29%	0.00%
Activities supported by AI resources have positively influenced my ability to formulate questions about the course content.	73.62%	20.25%	6.13%	0.00%	0.00%
I believe that generative AI has had a significant impact on the development of my critical thinking skills.	65.65%	28.22%	6.13%	0.00%	0.00%
Section 3: Integrating generative AI into course activities					
AI resources strengthened my ability to identify relevant information in academic tasks.	71.78%	23.93%	4.29%	0.00%	0.00%
Using AI resources helped me strengthen my ability to critically evaluate the quality of information sources.	71.78%	20.25%	7.97%	0.00%	0.00%
The use of resources designed with generative AI increased my interest in participating in the activities planned in this course.	76.07%	20.25%	3.68%	0.00%	0.00%
The use of generative AI in my academic activities has been an enriching and valuable experience for my training.	74.24%	17.79%	7.97%	0.00%	0.00%

Source: Own elaboration

4.2 Pre-Test and Post-Test Results

Table 2 presents the results obtained in the pre-test and post-test, which reflect the participants' performance before and after the implementation, based on the use of AI. This data allow for an analysis of the impact of the tools used in the learning process, demonstrating significant changes in the competencies assessed.

Table 2: Pre-test and post-test results

Descriptive statistics	Pre-test	Post-test
Average	8.14	8.62
Standard deviation	2.30	2.03
Minimum	3.00	4.00
Maximum	10.00	10.00
Student's t-test (paired)		
t-statistic: -5.27		
p=0.0000004256		

Source: Own elaboration

The post-test scores were higher than the pre-test scores, with a mean increase of 0.48 points. This difference was statistically significant, $t(162) = -5.27$, $p < .001$, with a small-to-moderate effect size, Cohen's $d_z = 0.41$. Regarding the qualitative results of the pre-test, it was found that most students focused primarily on providing a superficial description of the speakers' attitudes as part of their analysis of the selected political discourse. Furthermore, their assertions were not supported by a critical analysis of the arguments presented in the text and were limited to personal judgments about the observed attitudes.

Finally, although the ideas were clearly organized, the language used was basic and lacked in-depth reflection. In contrast, the results of the post-test demonstrated some improvement in the participants' ability to analyze the selected discourse. They analysed the political discourse in greater depth than in the pre-test, considering aspects such as coherence, relevance, and accuracy in identifying main ideas. In addition, more substantiated reflections were observed, in which the students were able to connect the analysed text with their own perspectives and the broader implications of the topic. It is important to emphasize that the language used by the participants in the post-test was more organized, logical, and clear.

4.3 Interview Results

The interview results revealed some advantages highlighted by the students interviewed. Figure 2 presents a word cloud that emphasizes the most frequently used terms as participants expressed their perceptions of the implementation.

One student noted, *"I think AI tools really motivate me because they make learning more dynamic and practical. I also feel they help me understand the course information quickly"*. These results align with the findings of Kumar et al. (2022), who stated that AI facilitates the design of activities tailored to students' interests, which increases their motivation in learning.

Additionally, the results show a favorable perception regarding the use of AI in students' training. Specifically, 71.79% of participants strongly agreed, and 19.63% agreed that this technology helped them understand complex concepts more effectively. Only 4.29% of participants were neutral, and another 4.29% disagreed, suggesting that some students may not have perceived the same benefits due to diverse learning styles and varying levels of familiarity with technology. In the interview, students spoke favorably about this aspect. For example, one participant mentioned, *"In my experience, generative AI was a key tool for understanding the course concepts. Furthermore, I feel that AI helped me process information in a more organized way and find explanations that fit my needs."* In this context, Moncayo Moscoso et al. (2024) asserted that the use of AI in teaching simplifies the understanding of complex concepts, which aligns with the findings obtained in this study.

The results show a positive perception regarding the impact of generative AI on student motivation to explore the topics covered. In this area, 71.78% of participants strongly agreed, and 28.22% agreed with this statement, while no students were neutral or disagreed. Similarly, those interviewed indicated that the use of AI keeps them motivated because it provides them with greater opportunities to develop the activities proposed by the teachers and resolve their doubts. In this regard, one of the interviewees stated, *"I think AI motivates me because it helps me resolve doubts about complex topics and improve my ideas"*. Therefore, AI is considered an effective tool for enriching the learning process, since it motivates students to learn from diverse perspectives. This relates to Isea Arguelles et al.'s (2024) finding AI increases motivation levels in the teaching-learning process.

Additionally, the activities based on the use of AI-generated resources had a positive impact despite the variability in students' perceptions of this aspect. Specifically, 43.56% of participants strongly agreed, and 28.22% agreed that the implemented activities improved their ability to evaluate arguments and reflect on the topics of study, demonstrating the benefits of AI. However, 28.22% maintained a neutral viewpoint, which could indicate that some students did not experience significant changes in their critical thinking. This neutral response suggests that the benefits of AI were not equally perceived. This may be related to differences in students' prior familiarity with AI, digital confidence, or ability to engage with AI-generated information.

Similar concerns have been reported by Pokrivcakova (2024), who found that pre-service EFL teachers may value AI positively while still having limited knowledge of its pedagogical use. Likewise, Farrelly and Baker (2023) emphasized that the educational value of generative AI depends on critical guidance, ethical awareness, and purposeful instructional design. These results are similar to those

found in the interview, in which favorable perspectives on the activities were shared. For example, one interviewee stated, *"The use of AI helps me develop my analytical skills, but I think its impact depends heavily on the strategies the teacher uses in class"*. These perceptions relate to the findings of De Estigarribia et al. (2024), that AI has the potential to mediate in the development of cognitive skills related to critical thinking.

The results show that using resources designed with generative AI tools allows students to develop their critical thinking skills, especially when analysing social problems from different perspectives. In this area, 65.65% of the participants strongly agreed, and 20.25% agreed, demonstrating that AI is a useful tool for fostering analytical skills in the teaching and learning process. However, 9.81% of the participants remained neutral, and 4.29% disagreed. Furthermore, the interview results revealed positive perceptions. In this respect, one student stated, *"I find AI-designed resources very beneficial, as they help me understand problems from different perspectives. They also allow me to understand how to approach complex situations"*. These findings relate to the work of Chan Núñez (2024), who emphasized that AI fosters students' critical, creative, and complex thinking skills.

Regarding activities supported by AI resources, the majority of participants (73.62%) strongly agreed and 20.25% agreed that these resources helped them formulate questions about the topics studied. This implies that AI tools improve inquiry skills, develop critical thinking, provide personalized support, and foster active learning. In this aspect, the interview results revealed that AI allows students to better structure their questions. One interviewee stated, *"Thanks to the activities carried out with AI support, I feel prepared to formulate more precise questions about the content, which has helped me feel more confident in my classes"*. These opinions demonstrate that AI generates students' greater confidence and autonomy. In this regard, Menacho et al. (2024) highlighted the importance of AI in promoting autonomous and self-regulated learning. Chhatrala and Chaudhari (2024) stated that AI strengthens the skills to question, explore new ideas, and develop creative solutions to complex problems.

Regarding participants' opinions on the impact of generative AI on the development of their critical thinking, 65.65% strongly agreed, and 28.22% agreed with this aspect. This implies that the use of generative AI develops students' ability to approach complex problems from diverse perspectives. One of the interviewed participants highlighted, *"The use of AI has developed my skills for analysing information before reaching a conclusion"*. In this respect, Mosqueda (2024) stated that AI plays a fundamental role in strengthening critical thinking in virtual education environments. Thus, the ability to identify biases and errors improves, contributing to autonomous academic development.

The results also showed a positive perception of the impact of generative AI resources on course activities. Of the participants, 71.78% strongly agreed and 23.93% agreed that their ability to identify relevant information in academic tasks improved. These findings suggest that AI enhances data search and selection. One of the participants stated, *"AI allowed me to perform searches more quickly and accurately; it also helped me focus on reliable sources for my assignments"*. This opinion

reinforces the idea that AI tools optimize data search and personalize learning, adapting it to students' individual needs. In this sense, Tapalova and Zhiyenbayeva (2020) affirmed that the use of AI enables personalized learning, providing each student with content tailored to their interests, which significantly contributes to improving their educational experience.

Likewise, the majority of students expressed that AI resources strengthened their ability to analytically evaluate the quality of information sources, with 71.78% strongly agreeing and 20.25% agreeing. These results suggest that participants consider AI a resource that strengthens their critical thinking, especially when selecting reliable information sources. In this regard, one student stated, *"AI has allowed me to analyze the information I need more effectively, since I can compare different sources and detect potential errors before using them in my academic work"*. Certainly, to achieve comprehensive educational development, students must participate in activities that include the critical evaluation of information, the connection between theory and practice, and deep personal reflection that goes beyond the simple memorization of facts (Saz-Pérez & Pizà-Mir, 2024).

Regarding the use of resources designed with generative AI, students' interest in participating in course activities increased significantly, with 76.07% strongly agreeing and 20.25% agreeing. This suggests that the use of AI is perceived as an effective strategy for fostering active participation in the course. Only 3.68% of participants remained neutral. In this regard, one interviewee stated, *"Generative AI has made the course activities more interactive and dynamic, which has motivated me to become more involved and explore the topics in greater depth"*. Consistent with this view, Sanabria-Navarro et al. (2023) pointed out that the implementation of AI has transformed education by providing effective solutions that optimize student learning.

Regarding students' perceptions of academic activities, the majority considered the incorporation of generative AI to have been an enriching experience for their education, with 74.24% strongly agreeing and 17.79% agreeing. This indicates a predominantly positive perception of the impact of this technology on learning. In this respect, during the interview, one student stated, *"The resources used have allowed me to learn new concepts more effectively, helping me understand the topics and apply the knowledge to my academic assignments"*. This opinion reinforces the idea that AI enriches content comprehension and facilitates learning, providing significant educational advantages (Pokrivcakova, 2024). Similarly, Chicaíza et al. (2023) affirmed that students can interact effectively with AI models, obtaining immediate responses and improving their language skills.

5.2 Strengthening Critical Thinking Skills

Regarding RQ2, the findings suggest that the pedagogical integration of generative AI was associated with improvements in students' critical thinking skills. However, given the single-group design, these results should not be interpreted as definitive causal evidence, as other factors, such as repeated practice, instructor feedback, and regular course progression, may also have contributed to the observed gains. This cautious interpretation is important because students' development was gradual and emerged from differences

observed between the pre-test and post-test. In the pre-test, although participants were able to engage with contemporary political discourse, their analyses tended to rely on descriptive or opinion-based responses, with limited depth in argumentation and weak connections between ideas. Following the intervention, quantitative and qualitative results reveal a clear progression toward better forms of reasoning, characterized by greater analysis, logical organization, and the ability to articulate well-supported interpretations of discourse. Moreover, the use of generative AI tools functioned as mediational support, facilitating students' engagement with complex texts, enabling them to move beyond surface-level comprehension toward higher-order cognitive processes such as interpretation, evaluation, and inference. In line with sociocultural perspectives, the interaction with AI-mediated resources appears to have supported the internalization of analytical strategies, promoting more autonomous and reflective forms of thinking (Hong et al., 2025).

More specifically, the intervention fostered key dimensions of critical thinking. Students demonstrated an enhanced ability to evaluate arguments by examining coherence and relevance within texts. In addition, they showed increased capacity to approach issues from multiple perspectives. Another notable development was the improvement in inquiry skills, as learners became more capable of formulating precise and meaningful questions, a fundamental component of critical engagement and knowledge construction. These findings are consistent with recent research that highlights the role of AI in fostering critical thinking when embedded within structured pedagogical designs.

Studies by Alpizar and Martínez (2024), Islas et al. (2024), and Perezchica-Vega et al. (2024) reported that AI can enhance analytical and reflective capacities more effectively than traditional approaches, particularly by providing organized information, immediate feedback, and opportunities for iterative refinement. However, the results also suggest that the impact of AI is not inherently uniform and depends significantly on the instructional strategies employed. While overall improvements were observed, some participants did not demonstrate equivalent levels of development in all dimensions of critical thinking. This indicates that AI does not guarantee cognitive advancement; rather, its effectiveness is contingent upon purposeful integration, guided reflection, and alignment with learning objectives.

6. Conclusions

The integration of generative AI into higher education has a significant impact on EFL teaching. Certainly, the use of this technology strengthens students' linguistic knowledge and develops their critical and reflective thinking skills through resources adjusted to their needs and preferences. AI-supported activities increase student motivation and offer greater opportunities for meaningful learning. This fosters an interest in understanding and critically analysing different types of contemporary discourse. Furthermore, AI tools help students improve their ability to evaluate arguments rigorously.

Generative AI simplifies and organizes information of varying complexity, enabling students to develop their analytical skills in a coherent, accurate, and relevant way. Thus, when students interact with AI, they improve their ability to analyze current English discourse, preparing them to make informed judgments on a variety of socially relevant topics. The guided use of AI tools promotes student autonomy and strengthens their ability to formulate questions. Furthermore, it allows students to explore new ideas and examine in greater depth their subjects of study. In other words, this technology fosters active and self-directed learning because it acts as a facilitator that stimulates curiosity and interest.

Given that the participants in this study exhibited varying levels of knowledge regarding the use of AI in education, it is necessary to examine its impact more deeply, particularly on the development of critical thinking skills. In this regard, future research could explore the effectiveness of different AI tools in other educational contexts and at different levels of language proficiency, considering factors such as accessibility and adaptability to students' preferences. This study contributes to the field by showing that, when intentionally guided by teachers, multiple AI-supported resources can enhance critical thinking, discourse analysis, and reflective inquiry in teacher training. Therefore, teacher education programs should prepare future educators to use AI critically, ethically, and pedagogically. Finally, longitudinal studies are needed to measure its long-term impact.

Conflict of Interest

The authors declare no conflicts of interest.

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