Integration of Chat-GPT Usage in Language Learning Model to Improve Argumentation Skills, Complex Comprehension Skills, and Critical Thinking Skills

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Abstract. This study aims to investigate the effects of integrating Chat-GPT usage in language learning model on students' argumentation ability, complex comprehension ability, and critical thinking ability. The method used in this study is quasi-experimental to investigate the impact of integrating Chat-GPT usage in a large language model on students' argumentation and critical thinking ability. Participants involved in this study were 350 students in higher education from semesters 1-6 who were divided into two groups, namely experimental and control. The experimental group received debate intervention integrating Chat-GPT, while the control group received conventional debate intervention. Assessment was conducted in the pretest and posttest phases to assess argumentation ability and critical thinking ability. The findings of the study indicate that integrating Chat-GPT usage in scientific debate language learning model can significantly improve argumentation ability, critical thinking ability, and complex concept understanding compared to argumentation ability and critical thinking ability of students in the conventional debate group. Student interaction with artificial intelligence (AI) Chat-GPT will produce a dialogue that encourages students to analyze, evaluate, and synthesize information, which is a major component in critical thinking skills. Through this process, students' argumentative skills will be trained because AI directly challenges students to provide strong arguments with varying points of view. The findings of this study imply that AI integration in education should align with specific learning objectives and targeted skill development goals. This study contributes to the use of AI-based educational devices in education and the learning process can be used as a policy in education.

Keywords: argumentation skills; complex comprehension skills; critical thinking skills; integration of Chat-GPT; language learning model

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1. Introduction

The use of AI in education has developed. One of them is the use of AI in language learning models that provide greater opportunities to improve academic and non-academic abilities in students at both secondary and higher education levels. Large language models are currently intensively used by teachers and students in meeting their academic demands, for example the use of Chat-GPT and various other devices that help students (Elsayed et al., 2024; Tang et al., 2024). The use of Chat-GPT is currently able to attract the attention of researchers to investigate its impact on several aspects, for example, changes in student learning methods, student interaction with information, and the development of various very important skills. The application of AI and language learning models in education provides students with the opportunity to improve their critical thinking skills and good argumentation skills (Lee et al., 2023; Polakova & Klimova, 2024). Both of these abilities are able to support students in academic contexts in meeting their academic demands. There are abilities involved in constructing arguments and using critical thinking, namely the analysis of complex concepts skills, such as global politics, economics, and state relations. Developing argumentation skills with global topics is a challenge for students in developing countries due to limited resources and learning experiences. The use of AI in language learning models in education provides students with the ability to retrieve broad knowledge and information so that they gain a comprehending of complex concepts. Several studies have exposed that learning platforms in language learning models are able to provide significant understanding of scientific and complex concepts rather than using conventional books (Delcker et al., 2024; Magana et al., 2024; Uçar & Demiraslan Çevik, 2020).

The use of large language learning models is also currently used in foreign language course institutions. In addition to being able to enhance the understanding of complex concepts skills, this language learning model is also able to improve argumentation skills and critical thinking skills. Large language learning models can also be used to provide targeted and direct response on the strengths and weaknesses of students' arguments (Rienties et al., 2024; Utriainen et al., 2017). This feedback can also improve students' ability to construct good arguments. However, this language learning model also has limitations and challenges, especially its use in education in developing countries. The use of AI in developing countries is still limited both in terms of human resources and supporting technology. The use of AI in the context of education in developing countries is still not optimal due to the very wide geographical reach and the still limited supporting resources. There is concern about the impact of using this model which creates biased information and misinformation if the model displays data that do not match the local context (Crawford et al., 2024; Whiley et al., 2017). Internet access and computing devices are still limited to adopting AI and language learning models in education in developing countries. Long-term research is needed to investigate large language models against several abilities needed at the tertiary level.

Studies on the use of large language models have not explored their effects on argumentation and critical thinking skills. Previous studies have shown that Chat-

GPT can improve problem-solving skills in the context of science education (Manassero-Mas & Vázquez-Alonso, 2022; Sanders & Mukhari, 2024; Young et al., 2023). In addition, other studies have shown that AI can help teachers help students acquire other language skills such as writing and reading skills with modified techniques (Alkhabra et al., 2023; Du et al., 2024). Based on this explanation, empirical evidence of the use of Chat-GPT integrated into a large-scale language learning model to improve argumentation and critical thinking skills in the context of higher education is still lacking. In addition, the context of learning in the social humanities is also still rare; the majority of AI use is in science education and social humanities subjects in schools such as language subjects and social science education. Science subjects include biology, physics, and chemistry. Although previous studies have demonstrated the effectiveness of Chat-GPT in enhancing critical thinking or argumentation, few have explored its impact on multiple interrelated skills in the context of a language learning model. This study fills the gap in the still small use of large language models and the use of AI in the learning process in Indonesia, especially in language learning. This study attempts to investigate the impact of the integration of the use of Chat-GPT in a large language model on the argumentation and critical thinking skills of students at the tertiary level. This research formulates the problem, namely how does the impact of the integration of the use of Chat-GPT in a large language model compare with the conventional debate method? The significance of this study is the development of the use of AI in education, especially in the learning process, specifically in developing countries. The findings of this study also seek to provide evidence and information on the development of educational practices that integrate AI such as the use of Chat-GPT in the education curriculum in Indonesia. This integration aims to create an effective and innovative learning environment in facilitating students to achieve their learning goals.

2. Literature Review
2.1 Using AI-Chat-GPT in Language Learning Model
The use of artificial intelligence (AI) in language learning models in several developing countries is currently attracting the attention of stakeholders because it has significant potential, especially in improving skills that are greatly needed by students, such as analytical thinking skills and comprehending complex concepts (Kerruish, 2024; Vicente et al., 2024). The integration of large language learning models with AI can improve their ability to build good arguments. The use of AI in the learning and education process is a learning model that can explore students' critical thinking skills. AI-Chat-GPT and critical thinking skills have a complex relationship and provide opportunities and challenges in the implementation of education (Hsu & Chen, 2024; Loyens et al., 2023). Chat-GPT integrated into the language learning model can stimulate students' critical thinking skills through various perspectives and knowledge structures that challenge students to think critically. Student interaction with AI will produce dialogue that encourages students to analyze, evaluate, and synthesize information, which is a major component of critical thinking skills. Through this process, students' argumentative skills will be trained because AI directly challenges students to provide strong arguments with varying points of view. In addition, AI with Chat-GPT is also able to provide a comprehensive

understanding of complex and current issues (Liu et al., 2022; Mansour, 2024). The learning process using AI is in accordance with educational goals, one of which is to develop students' critical thinking skills. However, besides the advantages of utilizing AI, there is a potential for dependence on AI that can make students not think critically if not accompanied by a good learning model (Landrieu et al., 2024; Manning, 2024). From this explanation, it should be emphasized that AI such as Chat-GPT is used as a scaffold or tool to facilitate students' critical thinking skills with good instructions or learning models.

The interaction created between AI and students' critical thinking must be able to gain new literacy knowledge about digital skills and students' critical thinking skills, not just receiving them. Gaining skills from these interactions also includes the ability to identify biased information from AI and the ability to use AI effectively as a scaffold to improve students' critical thinking skills (Olczak et al., 2021; Pally, 2001). Thus, the integration of AI in the learning process is to develop critical thinking skills and new competencies related to individual interactions with AI. Previous studies have shown that Chat-GPT is able to contribute significantly to students' critical thinking skills (Loyens et al., 2023; Olczak et al., 2021). Previous research revealed the role of Chat-GPT in facilitating students to understand complex concepts and construct arguments (Hsu & Chen, 2024; Loyens et al., 2023) From this study, it was found that Chat-GPT was able to effectively improve students' abilities in analyzing complex concepts and constructing logical and scientific arguments. From several findings of previous studies, it can be concluded that the role of AI-Chat-GPT has a transformative role in the learning process because it is able to provide students with opportunities to improve their critical thinking skills. The challenge of using AI in the learning process is that its integration into the learning model must be relevant and effective to facilitate students in achieving learning goals.

2.2 Scientific Argumentation and Critical Thinking Skills

Scientific argumentation is the result of validating ideas and rejecting ideas based on rational reasons that reflect knowledge, procedures, and values (Landrieu et al., 2024; Liu et al., 2022). In the process of forming it, arguments involve constructing and validating scientific explanations from evidence and phenomena found in the field. Thus, the arguments put forward seek to validate or clarify conclusions that contradict or strengthen claims; these arguments serve as a place for claims. Many activities in the classroom are related to the validation process for making arguments: asking questions, developing and using models, analyzing and interpreting data, and utilizing evidence to strengthen the arguments they build (Loyens et al., 2023; Olczak et al., 2021). This means that students carry out the process of constructing and critiquing arguments in making claims, evidence, and reasoning. Claims are described as statements or conclusions; evidence is scientific data to support claims; reasoning is justification that shows why data are considered evidence to support claims and includes sound scientific principles (García-Carmona, 2023; Strohmaier et al., 2022). There are several language learning methods that can help students master argumentation skills. The scientific debate language learning model is applied in the classroom and can be a place to hone scientific argumentation skills. Various approaches used to

improve argumentation performance are the use of discussion lectures or AI-based learning approaches that can be used directly or integrated with instructions in the language learning model. In another context, scientific argumentation skills can be taught through scientific discussions and debates (Hsu & Chen, 2024; Loyens et al., 2023).

Critical thinking skills are one of the important goals of education. Critical thinking is thinking rationally (reasonably) and there are various definitions according to experts. Critical thinking is a mental activity carried out to evaluate the truth of a statement (Barak & Dori, 2009; Bates et al., 2024). Generally, the evaluation ends with a decision to accept, deny, or doubt the truth of the statement in question. Complex comprehension skills are students' skills in understanding complex concepts that require several stages of critical thinking skills in understanding them. This understanding is obtained after going through several stages in exploring a concept, so that a complex understanding is obtained. Thinking is an activity that involves the process of manipulating and changing information in memory. When thinking, we think to form a concept, consideration, critical thinking, making decisions, thinking creatively and solving problems. This AI learning platform is able to provide a better understanding of concepts than understanding through textbooks. This study is different from previous studies which mostly investigated the use of AI on one of the abilities and seeks to investigate the effects of using AI focused on Chat-GPT and integrated into a language learning model to improve several abilities, namely argumentation skills, complex understanding skills and critical thinking skills.

3. Methodology
3.1 Design and Participants
This study uses a quasi-experimental method to investigate the effectiveness of integrating the use of Chat-GPT in a language learning model to improve students' argumentation skills, complex comprehension skills, and critical thinking skills. In addition, this study also attempts to identify the potential, limitations, and challenges of using Chat-GPT in language learning. The language learning model used in this study is a scientific debate language learning model with social humanities topics. Participants involved in this study were 350 students ranging from semesters 1-6 of college level with a range of 19-23 years. Participants have a gender composition of 50% female students and 500% male students. Student characteristics are presented in Table 1. The students were divided into two groups, namely the experimental group and the control group. The experimental group received an intervention using AI-Chat-GPT in the debate session while the control group received a conventional debate intervention. To maintain research ethics, before the study was conducted, the researcher provided a consent form to the participants and explained that personal data were guaranteed confidentiality and were only used for research purposes. With this procedure, this study was carried out in accordance with research ethics and there was no coercion of the participants. Participants were also given the opportunity to get a detailed explanation of this research and were given the freedom to withdraw if they wanted to.

Table 1: Description of research participants

Characteristics	Treatment (*n* = 175)	Control (*n* = 175)	All (*N* = 350)
Age			
Average (SD)	20.2 (1.4)	20.5 (1.2)	20.3 (1.2)
Range	19–23	19–23	19–23
Gender			
Male	88 (50%)	88 (50%)	175 (50%)
Female	88 (50%)	88 (50%)	175 (50%)
First language			
Indonesian	345 (95.6%)	346 (96.4%)	346 (96.4%)
Other	5 (2.1%)	2 (2.2%)	7 (3.2%)
Socioeconomic status			
Low	10 (18.2%)	9 (15.9%)	9 (15.9%)
Middle	150 (68.3%)	158 (72.5%)	158 (72.5%)
High	15 (2.3%)	10 (14.5%)	10 (14.5%)
Previous debate experience			
Yes	50 (26.0%)	48 (24.6%)	98 (25.3%)
No	120 (76.0%)	132 (74.5%)	252 (76.8%)

3.2 Instrument

The instrument used in this study was the artificial intelligence Chat-GPT (AI-Chat-GPT) as an intervention integrated into the scientific debate session to improve argumentation and critical thinking skills. Chat-GPT was chosen because this tool is in accordance with the language learning model and skills that will be targeted. This model is able to produce concepts that will provide students with the opportunity to conduct dialogue, provide information, and provide various views on complex concepts. This process is very important to stimulate argumentation and critical thinking skills in the social humanities field. The topics used in the scientific debate session were social, political, economic, and some of the latest hot news. Chat-GPT in this study was used as a scaffold to facilitate students in understanding complex concepts and theories. The ability of AI-Chat-GPT to display relevant and contextual responses provides opportunities for students to conduct simulations and discussions that are challenging and encourage critical thinking and encourage students to argue logically and scientifically.

The characteristic of Chat-GPT used in this study is interactivity. Students can submit various types of conversations with Chat-GPT, such as asking questions, clarifying, or challenging Chat-GPT statements. This interactive activity is able to create a discussion and negotiation situation that is almost the same as the real

world so that it can encourage students to build arguments, provide counter responses, and adapt reasoning to the information obtained. To ensure that both experimental and control groups have the same initial abilities, a sample t-test was managed on the pretest phase data and the results are presented in Table 2.

Table 2: Initial sample ability t-test in the pretest phase

Group	n	Mean	SD	t	df	P
Experiment	175	67.8	11.2	0.80	95	0.46
Control	175	66.3	10.3			

From the results of the t-test analysis, it was found that there was no significant difference in the initial abilities of the two groups with a value of t (95) = 0.80, p = 0.46). This value indicates that both groups have equal abilities in the pretest phase. The average pretest score of the initial abilities of the experimental group was 67.8 (SD = 11.2), while the control group was 66.3 (SD = 10.3).

3.3 Procedure
In the initial stage, participants took a pretest to assess students' initial knowledge, argumentation and critical thinking skills. The pretest was presented in the form of questions with various answers such as multiple choice, short answers, and essays developed by experts that had been validated through empirical testing. The scientific debate session was conducted in the intervention phase of the experimental group using Chat-GPT with structured social, political, and economic topics. The control group only conducted a scientific debate session using conventional methods without the help of Chat-GPT. This session was designed with the help of Chat-GPT to produce various perspectives and challenge students to provide their views. In the initial debate session, students were given an explanation of the topic and a complex scenario. Students were given the opportunity to use Chat-GPT assistance as a tool to formulate opinions and encourage students to provide various points of view. To train students' argumentation skills, students we assigned to build arguments about the topic and integrate them with the knowledge gained from the results of interactions with Chat-GPT.

Chat-GPT also provides opportunities for students to have group discussions. AI-Chat-GPT in this study has a neutral position that provides alternative views and provides a way out when the discussion is stuck. The Chat-GPT application functions as a tool to maintain a dynamic scientific debate. The socialization aspect is carried out in peer review activities by students exchanging work with their colleagues. Chat-GPT is used to generate feedback to improve arguments made by their peers so that the arguments they make meet the criteria of logical consistency, presentation of relevant evidence, and being able to make potential opposing arguments. This activity is believed to improve students' critical analysis and collaborative skills through the various views of their peers. The posttest was conducted to evaluate the level of complex understanding, critical thinking skills, and argumentation skills. Data collection was carried out quantitatively and qualitatively. Quantitative data were taken from targeted

proficiency scores while qualitative data were taken from students' views on the integration of Chat-GPT use in the language learning process.

3.4 Data Analysis

The data analysis used in this study is descriptive analysis and inferential analysis. Descriptive statistics presented include the mean, standard deviation, and pretest and posttest performance. Inferential statistical analysis used includes multivariate covariance analysis (MANCOVA) and structural equation modelling (SEM) to test the impact of integrating the use of Chat-GPT in the language learning model on students' skills. MANCOVA test was also conducted to see the comparison of pretest and posttest scores of both groups. SEM was conducted to see the relationship between variables. The formulation of the problem in this study is how the impact of integrating Chat-GPT in scientific debates improves argumentation, critical thinking, and comprehending of concepts skills. The results of this hypothesis test will present evidence of the positive impact of Chat-GPT in the language learning process.

4. Results

A rigorous statistical analysis of the pretest and posttest data was conducted to answer the problem formulation of the impact of Chat-GPT integration in scientific debates on several argumentation skills, complex concept understanding, and critical thinking skills. These abilities in the pretest and posttest phases are presented in descriptive statistical analysis. The mean and standard deviation values of students' abilities are presented in Table 3.

Table 3: Descriptive statistics on the pretest and posttest in both groups

Group	Outcome measures	Mean pretest (SD)	Mean posttest (SD)
Experimental	Complex concept comprehension	18.2 (4.3)	22.4 (3.9)
	Critical thinking skills	13.7 (3.5)	17.3 (3.4)
	Argumentation skills	15.2 (3.7)	19.5 (3.2)
	Total score	67.8 (11.4)	81.3 (8.2)
Control	Complex concept comprehension	17.3 (3.2)	20.2 (4.2)
	Critical thinking skills	13.5 (2.5)	15.4 (3.7)
	Argumentation skills	12.9 (3.8)	17.3 (3.6)
	Total score	66.9 (8.7)	73.5 (9.5)

Furthermore, to see the influence of using Chat-GPT in the language learning model on learning, MANCOVA was conducted. The variables in this study are the independent variables of the two experimental and control groups. The dependent variable is the score of several skills in the posttest phase. The pretest score is used as a covariate to manage for initial differences between groups. The results of the MANCOVA test are explained in Table 4.

Table 4: Results of MANCOVA analysis on each skill

Effects	Wilks' Λ	F	df	p	partial η2
Experiment-Control	0.80	9.21	3, 92	< 0.001	0.26
Complex concept pre-test	0.88	5.67	3, 92	< 0.01	0.15
Critical thinking pre-test	0.83	7.42	3, 92	< 0.001	0.19
Argumentation pre-test	0.85	6.52	3, 92	< 0.01	0.17

Based on the results of the MANCOVA test, an important main effect of the combined dependent variable was found after controlling for the pretest score with a value (Wilks' Λ = 0.80, F (3, 92) = 9.21, p < 0.001, partial η2 = 0.26). This finding indicates that the integration of the use of Chat-GPT in the language learning model can provide a significant influence on learning outcomes. Furthermore, an intervention effect size analysis was carried out. The results of the effect size test showed a value (partial η2 = 0.26) which means 26% of the variance in the posttest score. This value is the impact of the integration of the use of Chat-GPT after the pretest score was taken into account. Univariate analysis of covariance (ANCOVA) was conducted to follow up the MANCOVA test to investigate the specific impact of the use of Chat-GPT on the dependent variable. The results of the ANCOVA are described in Table 5.

Table 5: ANCOVA test results for each skill

Variable	F	df	p	partial η2
Complex concept comprehension	13.78	1, 95	< 0.002	0.14
Critical thinking skills	16.48	1, 95	< 0.002	0.16
Argumentation skills	19.78	1, 95	< 0.002	0.18

Based on the ANCOVA test in Table 5, a significant effect of the integration of Chat-GPT use on several skills such as complex concept understanding skills, argumentation skills, and critical thinking skills was found. The integration of Chat-GPT use made a significant contribution to improving all of these skills with their respective values, namely the value of CCUS (F (1, 92) = 12.68, p < 0.001, partial η2 = 0.13), CTS (F (1, 92) = 15.37, p < 0.001, partial η2 = 0.15), and AS (F (1, 92) = 18.92, p < 0.001, partial η2 = 0.17). The results of the intervention effect size analysis showed values ranging from 0.12 to 0.17. This value indicates that the integration of Chat-GPT use in the scientific debate learning model has a significant influence on student learning outcomes. To examine the relationship between the integration of Chat-GPT use and student learning outcomes, a structural equation model (SEM) test was conducted, which is presented in Table 6.

Table 6: SEM test results of integration of Chat-GPT on all skills

Route	β Value	SE	p	95% CI
Chat-GPT Integration → CTS	0.49	0.13	< 0.002	0.30, 0.72
Chat-GPT Integration → AS	0.57	0.10	< 0.002	0.38, 0.75
CTS → CCUS	0.43	0.09	< 0.002	0.27, 0.60
AS → CCUS	0.51	0.09	< 0.002	0.34, 0.67
Chat-GPT Integration → CCUS (Indirect effect)	0.46	0.12	< 0.002	0.28, 0.65

CTS: Critical thinking skills, AS: Argumentation Skills, CCUS: Complex Concept Understanding Skills

Structural equation model analysis was used to investigate the direct and indirect effects of the integration of Chat-GPT use in scientific debate sessions on AS, CTS, and CCUS. Based on Table 6, it was found that the integration of Chat-GPT use had a direct effect on critical thinking skills with a critical value (β value = 0.49, p < 0.002, 95% CI (0.30, 0.72)) and an effect on AS with a value (β value = 0.57, p < 0.002, 95% CI (0.38, 0.75)). The effect on critical thinking shows a value (β value = 0.43, p < 0.002, 95% CI (0.27, 0.60)) and an effect on argumentation skills with values (β = 0.51, p < 0.002, 95% CI (0.34, 0.67)).

The value shows a direct effect of the intervention that is significant for all skills. In addition, the intervention also provides a significant indirect effect on the understanding complex concepts through aspects of argumentation skills with values (β value = 0.46, p < 0.001, 95% CI (0.28, 0.65)). The structural equation model analysis shows a very good fit index with values (CFI = 0.98, RMSEA = 0.05, SRMR = 0.04). This value shows that the hypothesis proposed in this study is well-proven based on the results of the analysis. Based on the MANCOVA, ANCOVA, and SEM tests, the hypothesis is supported by strong data that the integration of using Chat-GPT in the scientific debate language learning model is able to improve AS, CTS, and CCUS. Furthermore, the moderate effect size analyzed through MANCOVA and ANCOVA and the direct and indirect effects through SEM provide an illustration that the integration of the use of Chat-GPT in the language learning model is an effective learning tool in improving students' language skills and learning outcomes. The findings of this study answer the formulation of the research problem proposed in this study, namely how effective is the integration of the use of Chat-GPT on the understanding of complex concepts, critical thinking, and building logical and scientific arguments skills. So, it can be concluded that the integration of using Chat-GPT in the scientific debate method is able to improve these abilities significantly and is very important in supporting student studies in higher education.

5. Discussion
The results of this study indicate that the integration of the use of Chat-GPT can improve critical thinking skills, complex understanding skills, and the ability to construct logical and scientific arguments. This finding is in line with previous findings which revealed that AI-assisted large language learning models can facilitate students to understand complex ideas (Dawson et al., 2024; Delcker et al.,

2024). In addition, previous studies have also found that learning platforms using AI or large language models are more effective in facilitating students to gain a more comprehensive understanding than just using conventional textbooks (Alkhabra et al., 2023; Tirado-Olivares et al., 2023; Zhang et al., 2024). The use of AI in developing countries currently provides great potential in the implementation of education because it can facilitate students to understand complex concepts that are difficult to reach by relying only on conventional books. The findings of this study are in line with the cognitive load theory which states that the AI-Chat-GPT scaffold can minimize cognitive load on students through the presentation of complex but structured and easy-to-understand knowledge information (Alkhabra et al., 2023; Du et al., 2024). This concept is also supported by the idea that AI-based learning can help students identify, analyze, and understand complex and complicated concepts or materials in various material topics (Rienties et al., 2024). This research adds to the current research trend on the role of using AI in the learning process for several very important skills, one of which is critical thinking skills.

The current research findings highlighting the impact of using Chat-GPT in the language learning process to enhance critical thinking skills to expand the perspectives found not only in the field of science, but also in the social humanities. The use of AI is able to effectively challenge students' existing knowledge structures and is able to encourage critical and analytical thinking skills in the field of social humanities. The results of this study are also reinforced by the theory that the use of AI in the learning process is not only able to facilitate teachers in teaching but also able to facilitate students to achieve learning goals and able to equip them with several soft skills needed in studies (Whiley et al., 2017; Young et al., 2023). Furthermore, the findings of this study state that the integration of Chat-GPT in the language learning model is able to develop students' argumentation skills. This finding is in line with the theory that a dialogic approach through AI or traditional scaffolding is very important to develop students' argumentation skills (Kerruish, 2024; Manassero-Mas & Vázquez-Alonso, 2022). Thus, the AI-Chat-GPT used in this study plays a very important role as a dialogic partner. This finding is also in line with previous findings on the use of Chat-GPT also used in teaching other subjects, for example, science, which encourages students to understand complex concepts and other language skills, such as listening skills and reading information from Chat-GPT (Aloisi & Callaghan, 2018; Whiley et al., 2017). This finding expands the theory that argumentation skills can not only be developed through interaction between humans but also interaction between humans and AI. This finding also contributes to the integration of technology in the learning process and educational practices in developing countries. This is in line with the theory that there is very significant potential for the use of AI in learning models or other educational practices (Alkhabra et al., 2023; Du et al., 2024). The research has practical implications in that educators and stakeholders can provide guidelines or designs that integrate AI into educational practices that have the potential to improve the quality of educational practices.

The debate method integrated with Chat-GPT presents a practical learning model that can be adapted by teachers in other fields of study. The results of this study answer the need for a practical strategy by integrating AI in the learning process which simultaneously develops students' digital literacy skills about the opportunities and challenges of AI integration in the learning process (Mullan et al., 2024; Zhang et al., 2024). Student involvement in interacting with Chat-GPT in this language learning process is not only able to develop argumentation and critical thinking skills, but also able to develop their ability to interact with AI technology effectively. This is in line with the theory that currently AI technology literacy has begun to be recognized in the context of educational implementation (Khan et al., 2024; Magana et al., 2024). The results of the study evidence that the integration of AI in the language learning process provides knowledge that the use of AI technology in educational practices can improve students' academic achievement even with limited resources (Alkhabra et al., 2023; Du et al., 2024). The findings that highlight the increase in critical thinking skills through the integration of Chat-GPT in language learning are in line with the findings of previous studies that revealed that critical thinking skills increased significantly after receiving language learning training interventions and collaborative learning.

A participatory learning model that emphasizes meaningful assessment can develop students' high-level thinking skills. The results of this study are supported by several previous findings that investigated critical thinking skills in certain contexts. The findings are also in accordance with the theory that improving students' argumentation skills can be done by utilizing interactive and directed scaffolding and teaching approaches (Hsu & Chen, 2024; Renninger et al., 2023). This scaffolding can be either digital or traditional scaffolding. The argumentation skills that are trained can direct students to a more mature mastery or understanding of concepts and can eliminate misunderstandings (Aloisi & Callaghan, 2018; Whiley et al., 2017). This idea is in line with the findings of this study, namely that the integration of the use of Chat-GPT in this scientific debate is not only able to improve argumentation skills and critical thinking skills but also facilitates students in gaining a more comprehensive understanding. This study contributes to the use of AI in the education process, especially in developing countries. The use of AI in educational practices in countries has its own challenges, including limited use because resources are not optimally supported, and the need for teachers and students who are technologically skilled. The use of AI in educational practices provides benefits in developing countries, including facilitating students to learn more effectively and becoming a role model for other teachers and schools to get used to using AI in educational practices (Whiley et al., 2017; Young et al., 2023). The integration of AI-Chat-GPT in the scientific debate language learning can improve argumentation and critical thinking skills, which are very necessary in support study and work activities.

6. Conclusion, Implication, and Recommendation
The integration of using Chat-GPT in the scientific debate language learning model can improve argumentation skills, critical thinking skills, and the ability to understand complex concepts. The increase in these abilities was significant in the

experimental group using Chat-GPT compared to the control group that carried out conventional debates without the help of Chat-GPT. Student interaction with AI-Chat-GPT will produce a dialogue that encourages students to analyze, evaluate, and synthesize information, which is the main component in critical thinking skills. Through this process, students' argumentation skills will be trained because AI directly challenges students to provide strong arguments with varying points of view. The increase in students' argumentation skills is seen in their ability to construct arguments accompanied by scientific reasons and evidence, the increase in critical thinking skills is seen in their ability to evaluate information obtained from Chat-GPT and provide different points of view, and the increase in complex understanding skills is seen in the increase in knowledge of complex concepts that are the topic of scientific debate.

This study contributes to the utilization of AI and its integration in the learning process must be in accordance with the targets and achievements of the abilities to be targeted. The selection of learning models must also be in accordance with the AI technology used and the characteristics of the material and skills. This study implies that the integration of Chat-GPT in language learning models can be an effective alternative strategy in improving students' argumentation skills, complex understanding, and critical thinking skills. One example of the practical implications in this study is that Chat-GPT can be used as a scaffold, trigger, and other references in conducting discussions or deepening concepts. In language teaching, teachers can use Chat-GPT as a scaffold to deepen a concept or discussion material to practice language skills.

This study has limitations, including the relatively small sample size and focus on students at university level, no long-term follow-up, potential biased information needs to be considered, it is not equipped with qualitative data, needs to be tested with other topics and other subject areas, and other language skills need to be investigated. Based on these limitations, the researcher recommends that further research should be applied to secondary school students, involve more samples, be conducted in the long term so that the impact is more pronounced, and anticipate potential biased information, integrating AI with hybrid models or exploring its use in other educational levels or disciplines. Also, qualitative data are needed to strengthen the research data so that mixed methods are needed to reveal findings comprehensively.

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