

Introduction

Artificial Intelligence (AI) is rapidly transforming various sectors, and education stands as a prime beneficiary of its revolutionary potential. Educators have consistently sought innovative approaches to enhance teaching and learning outcomes, and AI tools offer promising avenues for achieving this goal. However, the effective integration of AI in education hinges on two crucial factors: AI literacy and prompt engineering. AI literacy encompasses a fundamental understanding of AI concepts, including their functionalities, applications, and ethical implications. As emphasised by Sperling et al. (2024), AI literacy is paramount for educators to effectively incorporate AI tools into their teaching practices and navigate the complexities of AI integration.

Prompt engineering, on the other hand, represents the technical skillset required to interact with AI systems, particularly conversational AI like ChatGPT. It involves the meticulous crafting and refinement of input prompts to elicit precise and relevant responses from AI models. Lo (2024) aptly describes prompt engineering as a key determinant of AI performance, underscoring its importance in influencing the quality and relevance of AI-generated outputs. While the transformative potential of AI in education is widely recognised, research suggests significant gaps in educators' AI literacy and prompt engineering skills, hindering optimal AI integration (Jiang et al., 2024). Although best practices for prompt engineering are emerging, effectively applying these practices across diverse educational contexts remains a challenge (Ranade et al., 2024).

This gap is further highlighted by studies advocating for widespread AI literacy and advanced prompt engineering skills among educators. Walter (2024) envisions a future where teachers seamlessly integrate AI tools into their pedagogy, leading to enhanced learning outcomes and dynamic educational experiences. Achieving this vision requires ongoing professional development programs, access to cutting-edge AI resources, and robust support systems within educational institutions (Jia et al., 2024). However, the current state of AI integration in Algerian education remains limited, with many teachers lacking comprehensive training in AI technologies (Laupichler et al., 2022) and prompt engineering (Walter, 2024). This gap presents a significant barrier to harnessing the full potential of AI in transforming educational practices and improving student engagement and achievement.

This study addresses this critical need by investigating the relationship between EFL teachers' ability to engineer effective prompts for ChatGPT and their perceived quality of the AI-generated responses. Specifically, the research aims to examine whether a higher level of AI literacy, as evidenced by the quality of their prompts, correlates with teachers eliciting more valuable responses from ChatGPT for EFL instruction. Understanding this relationship is significant because it can inform the development of tailored professional development programs aimed at enhancing teachers' AI literacy and, consequently, their ability to leverage AI tools effectively in the EFL classroom. By illuminating the interplay between AI literacy, prompt engineering, and perceived value in AI-generated outputs, this study aims to provide valuable insights for effectively integrating AI tools like ChatGPT into language teaching practices. The following research questions are raised:

- (1) To what extent does the quality of EFL teachers' engineered prompts for ChatGPT reflect their AI literacy?
- (2) How do EFL teachers perceive the usefulness and challenges of AI-generative tools in

education, particularly in EFL learning contexts?

Literature Review

AI encompasses computer systems designed to perform tasks typically requiring human intelligence, such as learning, problem-solving, and decision-making (Jia et al., 2024). Recognising the growing influence of AI across various sectors, including education, the concept of AI literacy has emerged as a crucial competency for the 21st century (Bender, 2024). AI literacy reflects the ability to engage with the machine through effective tasks and human-machine communication (Knoth et al., 2024). It extends beyond mere technical proficiency, encompassing a multifaceted understanding of AI concepts, ethical implications, and practical applications (Li et al., 2022; Walter, 2024). This includes recognising the transformative potential of AI in educational contexts, as well as the challenges and ethical considerations that accompany its integration.

Generative AI represents a rapidly evolving subset of AI, encompassing algorithms designed to create new content, such as text, code, images, or even music. Notably, Large Language Models (LLMs) like ChatGPT have garnered significant attention for their ability to generate human-quality text in response to user prompts (Evmenova et al., 2024). This has led to the emergence of prompt engineering as a critical skill for effectively interacting with LLMs (Chen et al., 2024). The art of crafting precise instructions to elicit desired responses from these complex AI systems is known as 'prompt engineering'. The latter is a crucial skill for effectively utilising LLMs, thereby maximising the accuracy, relevance, and quality of their outputs (Marvin et al., 2023; Cain, 2024). As Gregory (2024) highlighted, prompt engineering in education demands a nuanced understanding of content knowledge, critical thinking, and iterative design to maximise learning outcomes.

Research has increasingly focused on the applications and implications of prompt engineering in education. Several studies have investigated the potential of prompt engineering to enhance learning experiences across various disciplines. For instance, Lee et al. (2023) demonstrated the efficacy of a validated automatic question generation system utilising LLMs and prompt engineering techniques for English education. Their findings highlighted the potential for collaborative AI-teacher efforts in creating engaging and effective learning materials. Similarly, Cain (2024) emphasised the transformative potential of prompt engineering in fostering personalised and equitable educational experiences. The study underscored how LLMs, combined with effective prompt engineering, can empower learners to become active co-creators of their education.

Despite these promising findings, challenges remain in effectively implementing prompt engineering in educational settings. Evmenova et al. (2024) explored the use of generative AI for writing instruction and feedback. Their findings highlighted inconsistencies in AI responses based on prompt variations and emphasised the need for careful consideration of student characteristics and learning needs when designing prompts. This underscores the need for continued research into best practices for integrating prompt engineering into diverse educational contexts.

The importance of AI literacy in effectively leveraging prompt engineering has been underscored by recent research. Studies have revealed a strong correlation between AI literacy levels and the ability to craft effective prompts. Knoth et al. (2024) found that individuals with a deeper understanding of AI concepts and technologies exhibited superior prompt engineering

skills. Their study underscored the importance of incorporating AI education into curricula to empower learners with the skills needed to navigate an increasingly AI-driven world.

Further emphasising the link between AI literacy and prompt engineering, Ranade et al. (2024) proposed a framework for prompt engineering that draws upon the principles of rhetorical situation, which is a concept familiar within technical communication. This approach aims to make prompt engineering more accessible and user-friendly by considering contextual and rhetorical factors when designing prompts. This highlights the need for professional development initiatives that move beyond technical skills and equip educators with a nuanced understanding of how to harness AI for effective learning.

While existing research has begun to explore the intersection of AI literacy and prompt engineering, a notable gap remains in EFL educational contexts. There is a scarcity of research investigating the AI literacy levels of EFL teachers and the impact of these levels on their prompt engineering skills. Moreover, quantitative studies exploring the relationship between AI literacy, prompt engineering, and learning/teaching outcomes in EFL contexts are particularly scarce. Addressing this gap is crucial to ensure that EFL educators and learners are not left behind in the rapidly evolving landscape of AI-powered education.

Methods

This study employs a one-phase, descriptive correlational design to investigate the relationship between EFL teachers' prompt engineering abilities and their perceived quality of ChatGPT's responses. This approach was chosen for its ability to capture both quantitative data on prompt quality and subjective evaluations of AI-generated output within a specific educational context.

Participants

To ensure the effectiveness and clarity of the research instruments, a pilot study was conducted with 10 EFL teachers from different Algerian universities. This initial phase took place in May 2023 and provided valuable feedback on the clarity of the task required from participants, the comprehensibility of its rating scale, and the overall feasibility of the study design. Based on the pilot study's insights, minor revisions were made to the instructions and rubric to enhance their clarity and relevance to EFL contexts. Following the pilot, the main study sample was recruited through convenience sampling from various online EFL teacher communities. This sampling method was chosen for its efficiency in reaching a geographically diverse pool of EFL professionals. The final sample consisted of 42 EFL teachers from 11 different Algerian universities with varying levels of teaching experience, offering a range of perspectives on utilising AI in language instruction. The model version of ChatGPT used in this study is ChatGPT 3.5.

Research Instruments

This study employed two primary instruments to gather data. First, a prompt engineering task was designed, providing teachers with a specific EFL classroom scenario and prompting them to engineer five distinct or serial prompts for ChatGPT. This task served as a measure of teachers' AI literacy in action. Second, a questionnaire was administered to gather demographic data and assess teachers' self-reported technology comfort levels, AI knowledge and attitudes, and perceptions of AI's usefulness in education, including open-ended questions about their experiences with the prompt engineering task and their views on AI literacy.

Research Procedures

Upon obtaining informed consent, teachers were provided with detailed instructions for the prompt engineering task, including the pedagogical scenario and the 5-point rating scale for evaluating ChatGPT responses (1: Poor / 5: Excellent). Teachers were given ample time to design their prompts and interact with ChatGPT. Following completion of the task, teachers' prompts were analysed using a pre-defined Prompt Quality Rubric (PQR). The latter was developed to provide a structured assessment of the quality and effectiveness of the engineered prompts. Recognising the dynamic nature of interaction with language models, teachers were given the flexibility to design either five sequential prompts that build upon each other or five distinct, independent ones for the given scenario. Regardless of their chosen approach, each prompt is evaluated individually using PQR, which comprises five key elements: prompting methodology, exigence, style and voice, clarity, and rhetorical purpose. Each element is scored on a binary scale (1 point for proficient demonstration, 0 points for lacking or inadequate demonstration), resulting in a total score ranging from 0 to 5 for each prompt. Data collection and analysis procedures are demonstrated in Figure One.

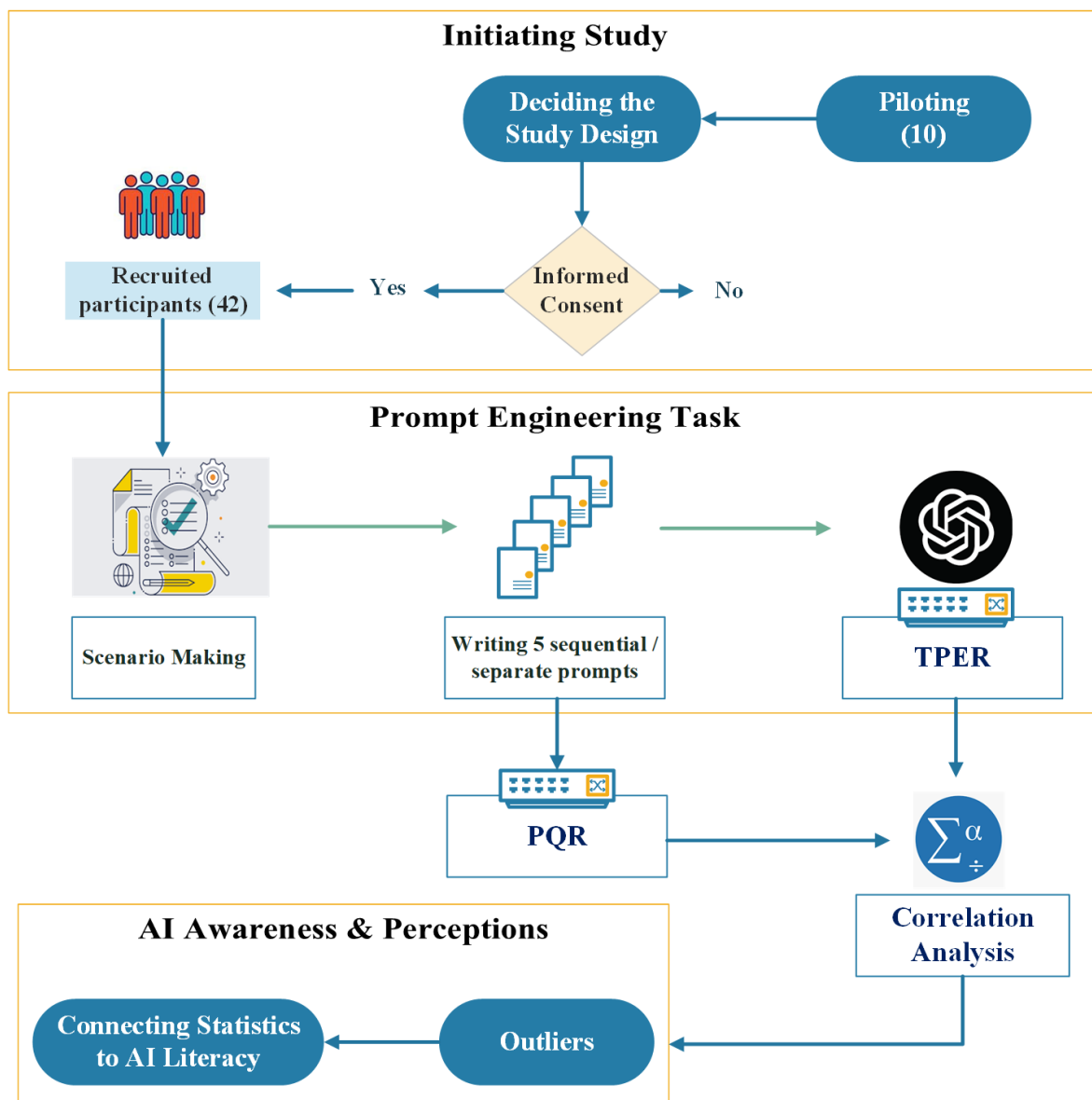


Figure 1. Data collection and analysis procedures

To examine the relationship between the quality of the engineered prompts and the Teachers' Perceived Effectiveness of ChatGPT's Responses (TPER), a correlational analysis is conducted. PQR scores of teachers' prompts are averaged to obtain an overall PQR score. Similarly, their TPERs to each prompt are averaged to provide a composite measure of satisfaction with the AI-generated output. Correlation analysis was calculated to determine the strength and direction of the association between these two variables. This analysis seeks to unveil whether higher-quality prompts, as assessed by PQR, are indeed associated with more favorable evaluations of ChatGPT's responses by the EFL teachers.

Results

Prompt Engineering Task

The table below demonstrates the preliminary analysis of sample prompts from two teachers. It offers initial insights into the relationship between prompt engineering and the perceived effectiveness of ChatGPT's responses. Teacher T01, focusing on integrating gender studies into an Algerian EFL context, demonstrates variability in both prompt quality and perceived effectiveness (M=2.8 / 3.8). Notably, the prompt requesting a lesson plan outline received the highest PQR score (4) and a correspondingly high TPER score (5), suggesting a link between specific, goal-oriented prompts and teacher satisfaction with ChatGPT's output.

Table 1. *Analysis of sample prompts*

Teacher (Scenario)	Prompts	PQR	TPER
T01 (Teaching Gender Studies in Algerian EFL Context)	<i>What are the major gender theories?</i>	2	3
	<i>I'm an EFL teacher in Algeria, and I want to introduce my students to basic concepts of gender identity and expression. Can you provide me with some general tips for approaching this topic respectfully in an Algerian context?</i>	3	4
	<i>Tell me about gender roles as portrayed in Western media compared to Algerian media</i>	2	3
	<i>Give me a brief outline for a lesson plan on gender stereotypes.</i>	4	5
	<i>How can an EFL teacher argue with a student who is curious about different gender identities but hesitant to ask questions openly?</i>	3	4
Mean		2.8	3.8
T02 (Designing a Test in Linguistics)	<i>I'm designing a multiple-choice quiz on pragmatics for my university-level EFL students. The quiz should focus on the concepts of implicature and speech acts. Can you provide a title for this quiz?</i>	5	4
	<i>Now, create three challenging multiple-choice questions testing students' understanding of implicature, with four answer choices (A-D) for each.</i>	5	5
	<i>Excellent. Now, create three more multiple-choice questions, but this time focus on different types of speech acts (e.g., requests, promises, apologies). Also include four answer choices.</i>	5	4
	<i>Now, for each of the six questions you've created, provide the correct answer (A, B, C, or D).</i>	5	5
	<i>Could you please format all of the quiz questions and answers in a clear and organised way for easy printing?</i>	5	5
Mean		5	4.6

In contrast, Teacher T02, aiming to design a linguistics quiz, consistently achieves high scores across all five prompts for both PQR (M=5) and TPER (M=4.6). This teacher's strategic use of chained prompts, progressively building upon previous responses, appears to contribute to both the high prompt quality and the perceived effectiveness of ChatGPT in fulfilling the desired task. This initial observation suggests that a structured, iterative prompting approach may be particularly conducive to generating favorable outcomes in specific educational scenarios. However, further analysis involving a larger sample size and correlational statistics is necessary to validate these preliminary observations.

Further analysis involving the whole sample size is necessary to validate these preliminary observations. The means of all prompts' PQR scores by each teacher are aligned with the means of TPER scores for the subsequent correlation analysis (see Table 2). The correlational analysis reveals a significant positive relationship between PQR and TPER, as evidenced by both Pearson and Spearman correlation coefficients. Pearson's R-value of .6021 suggests a moderate to strong positive linear association, indicating that as the quality of teachers' prompts increases, their perception of the effectiveness of ChatGPT's responses also tends to increase. This relationship is further supported by Spearman's Rho (r_s) of .594, demonstrating a consistent positive association even when considering potential non-linear relationships within the data.

Table 2. Correlation analysis of PQR and TPER scores

	M	SD	Pearson R	R ²	p-value	r_s
PQR	3.338	0.941	.6021	.3625	.000025	.594
TPER	3.595	0.785				

(M: mean; SD: standard deviation; R: Pearson Correlation Coefficient value; R²: the coefficient of determination; p-value: significance; r_s : Spearman's Rho Coefficient value)

Furthermore, the statistical significance of this correlation is highlighted by the extremely small p -value ($p < .000025$). This value, being much lower than the conventional significance level of 0.05, implies that the observed relationship between PQR and TPER is highly unlikely to have occurred by chance alone. The coefficient of determination, R², provides additional support for the practical relevance of this finding, explaining 36.25% of the variance in TPER scores through the variation in PQR scores. Therefore, this analysis strongly indicates that the quality of prompts engineered by teachers plays a significant role in influencing their evaluation of ChatGPT's responses in educational contexts.

The linear regression statistics (illustrated in Table Three) provide strong evidence that the quality of prompts engineered by teachers (PQR) is a statistically significant predictor of their perceived effectiveness of ChatGPT's responses (TPER). The F-statistic of 22.7448, with 1 and 40 degrees of freedom, signifies a substantial variation in TPER explained by the regression model compared to the unexplained variation. This is further supported by the extremely low p -value of .000024, which is smaller than the conventional significance level of 0.05.

Table 3. ANOVA's linear regression metrics

Source	df	Mean Square	F Statistic (df1, df2)	p-value
Regression	1	9.1781	22.7448 (1,40)	.000024

$$\hat{y} = 0.50242X + 1.9181$$

This result leads to rejecting the null hypothesis of no relationship, confirming that the linear regression model, represented by the equation $\hat{y} = 0.50242X + 1.9181$, significantly predicts TPER scores based on PQR scores. In simpler terms, for every one-unit increase in the PQR score, the TPER score is predicted to increase by 0.50242 points. This reinforces the notion that better-crafted prompts are associated with higher perceived effectiveness of AI-generated responses in this context.

Teachers' Views on AI Literacy

After engaging in the prompt engineering task, teachers' reflections on their AI literacy revealed a recurring theme: comfort with general technology use but a distinct uncertainty when it came to AI-specific knowledge and skills. Many echoed the sentiment of being "tech-savvy" but simultaneously feeling like novices when interacting with ChatGPT. This gap was particularly evident in their reflections on prompt construction, where teachers realised the need for greater precision and awareness of AI's capabilities and limitations. The task fostered a sense of metacognitive awareness, prompting teachers to critically examine their prompting process and identify areas for improvement.

This newfound awareness translated directly into a call for professional development opportunities tailored to AI literacy in education. Teachers expressed a strong desire for training focused on practical skills, such as crafting effective prompts and evaluating the quality of AI-generated outputs. Furthermore, they emphasised the need for guidance on ethical considerations and responsible AI integration, highlighting their concern for ensuring the safe and equitable use of these tools with their learners. While acknowledging the initial challenges, teachers consistently recognised the potential of AI to enhance teaching and learning. However, they strongly emphasised that realising such potential hinges on equipping educators with the necessary knowledge and skills to confidently and responsibly navigate the evolving landscape of AI in education.

Discussion

The study found that higher-quality prompts positively correlate with teachers' ratings for ChatGPT's responses. Moreover, teachers' self-perceptions of AI literacy were qualified with cautious optimism. Analysing the engineered prompts and teachers' subsequent reflections reveals an interesting discrepancy. While mostly demonstrating comfort with technology and digital literacy, a gap appears in the teachers' understanding of AI-specific concepts and effective prompting strategies. This suggests that while teachers are equipped to navigate digital environments, they require further development in AI literacy to unlock the full pedagogical potential of these tools. Targeted training on AI ethics, capabilities, and prompt engineering techniques will be crucial to empowering teachers to leverage AI effectively and responsibly in their classrooms.

The present study's findings align with and expand upon previous research highlighting the pivotal role of prompt engineering in maximising the utility of LLMs for educational purposes. Chen et al. (2024) emphasised the efficacy of carefully crafted prompts in guiding LLMs toward producing desired outputs, a notion strongly supported by the present study's findings. The positive correlation between PQR scores and TPER suggests that teachers who crafted higher-quality prompts were more likely to perceive ChatGPT's outputs as effective. This underscores the importance of equipping educators with the skills to construct clear, specific, and contextually relevant prompts to leverage AI effectively in their teaching practices.

Furthermore, this study reinforces the connection between AI literacy and prompt engineering quality observed in other research, specifically highlighting its relevance within the context of education. Knoth et al. (2024) found that non-experts' AI literacy, particularly their knowledge of AI technology, significantly influenced their ability to craft effective prompts. This study echoes that finding, as teachers' self-reported uncertainty with AI-specific concepts often manifests in less effective prompting strategies. The qualitative data further strengthens this connection, revealing that teachers who lacked confidence in their AI literacy tended to express more reservations about unguided AI use in education. These converging findings underscore the critical need for targeted professional development initiatives to enhance teachers' AI literacy, equipping them with the knowledge and skills to leverage these powerful tools effectively and responsibly in shaping the future of learning.

The findings regarding teachers' perceptions of AI-generative tools in education, particularly within the EFL learning context, present a nuanced perspective characterised by cautious optimism. While acknowledging the potential benefits of such technologies, the majority of teachers expressed reservations regarding unguided or autonomous use. The concerns primarily stem from the perceived risks associated with accuracy and authenticity. Teachers highlighted instances where AI-generated content, especially when used as the sole source of information, exhibited inaccuracies or lacked the depth and nuance expected in educational materials.

This cautious stance, however, does not equate to outright rejection. The emphasis on responsible implementation underscores a desire to harness the potential of these tools while mitigating potential pitfalls. Teachers strongly advocated for increased awareness and training initiatives focused on the mechanics of LLMs and generative AI. This proactive approach suggests a belief that both educators and learners can benefit from understanding the capabilities and limitations of these technologies. Besides, the self-reported lack of computational skills among some teachers underscores the need for targeted professional development opportunities to bridge the digital divide and empower educators to confidently navigate the evolving landscape of AI-powered tools in education. By uniquely combining quantitative analysis of prompt quality with qualitative insights into teachers' perceptions and experiences, the present study offered evidence to advocate for targeted professional development interventions aimed specifically at enhancing EFL teachers' AI literacy and their capacity to leverage AI tools effectively in language teaching.

Limitations

However, certain limitations should be considered when interpreting the findings. Firstly, the study employed a relatively small sample size, potentially limiting the

generalizability of the results to a wider population of educators. Secondly, while EPR provided a structured assessment of prompt quality, it may not have fully captured all nuances of effective prompting, particularly those related to specific subject-area needs or pedagogical goals. The observed outlier data points, where high-quality prompts did not always correspond with high perceived effectiveness scores, highlight the potential for individual variation and the influence of factors beyond the scope of the EPR. Future research could explore these nuances through qualitative analysis, incorporating teacher interviews or think-aloud protocols during the prompt engineering process.

Moreover, the study relied solely on teachers' self-reported perceptions of effectiveness. While valuable, these perceptions are inherently subjective and potentially influenced by factors such as prior technological experiences, novelty bias towards new tools, or individual comfort levels with AI. Triangulating these perceptions with objective measures of teaching outcomes or expert evaluations of AI-generated content would provide a more comprehensive understanding of the relationship between prompt quality and the actual effectiveness of AI tools in educational contexts.

Conclusion

As AI becomes increasingly integrated into education, the imperative to measure and enhance AI literacy among educators grows increasingly urgent. This paper targeted how EFL teachers' engineered prompts and their perceptions of ChatGPT's responses are correlated and reflect their AI literacy. It explored a novel approach to evaluating AI literacy through analysing teachers' prompt engineering skills. Specifically, we investigated the link between EFL instructors' ability to craft effective prompts and their subsequent perceptions of the quality of AI-generated responses. While cautiously optimistic about the potential of AI-generative tools to enhance EFL instruction, teachers expressed reservations about unguided or autonomous applications. This hesitancy stems primarily from concerns about the accuracy and authenticity of AI-generated content, particularly when utilised as the sole source of information. Therefore, this study underscores the importance of equipping educators with the necessary AI literacy to critically evaluate, adapt, and effectively integrate these rapidly evolving technologies into their pedagogical practices. Targeted professional development in prompt engineering, coupled with a deeper understanding of AI ethics and capabilities, is crucial to ensuring that teachers can confidently and responsibly harness the transformative potential of AI for language education.

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Declaration of AI Refined

This document has benefited from the application of AI-driven tools. These tools were utilised to correct grammar and spelling and improve the overall writing style. It is acknowledged that the use of these technologies may introduce certain AI-generated linguistic patterns. However, the core intellectual content, data interpretation, and conclusions presented remain the sole work of the authors.

Statement of Absence of Conflict of Interest

The authors declare that there are no conflicts of interest related to the research, findings, or recommendations presented in this paper. All conclusions drawn are independent and unbiased.

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