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Research Article

Exploring the relationship between critical thinking, attitude, and anxiety in shaping the adoption of artificial intelligence in translation among Saudi translators

Hassan Saleh Mahdi[1] and Yousef Mohammed Sahari[2]

[1]*Arab Open University, Kingdom of Saudi Arabia (ORCID: 0000-0003-4023-8219)*
[2]*Department of English Language, The University of Bisha, Bisha, Kingdom of Saudi Arabia (ORCID: 0000-0001-8318-6987)*

Critical thinking and anxiety influenced the translation competence of translators. This study sought to examine the interactions between critical thinking, attitude, and anxiety influenced the translation competence of translators. This study adopted an empirical approach to collect data from 145 student translators from many colleges in Saudi Arabia. The questionnaire was used as a data collection tool. Data were analyzed by using structural equation modelling to find out the relationship between the study factors. The results indicated that there was a negative relationship between AI anxiety with critical thinking and attitude. However, there was a strong positive relationship between attitude with critical thinking, and Machine Translation anxiety. Also, there was a positive relationship between Machine Translation anxiety with AI anxiety and critical thinking.

Keywords: Anxiety; AI translation; Attitude; Critical thinking; Machine translation

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1. Introduction

In an increasingly interconnected world with a growing global economy, effective communication and collaboration across diverse cultures and populations rely heavily on translation. Proficiency in translation necessitates the acquisition of a range of skills, among which technological competence is crucial. This proficiency has become indispensable in light of the transformative impact of technologies such as machine translation, computer-assisted translation [CAT] tools, and artificial intelligence on the field. These tools not only expedite translation processes but also elevate the quality and precision, requiring translators to possess advanced technological skills to meet contemporary standards of accuracy and efficiency (Kornacki, 2018). This technological advancement has enabled translators to enhance the quality of translated texts, underscoring the inherent value associated with these applications. Consequently, most translators and translation service providers choose to integrate these tools into their daily workflows, considering the benefits they yield as essential in the modern translation landscape (Benmansour & Hdouch, 2023).

The mindset of translators holds significance in the field of translation tasks due to the numerous factors and cognitive processes involved. Scholars, beyond simply addressing language

Address of Corresponding Author

Hassan Saleh Mahdi, PhD, KSA P.O.Box 84901 Riyadh 11681 Prince Faisal Ibn Abdulrahman, Hittin, Saudi Arabia.

✉ h.mahdi@arabou.edu.sa

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translation, have delved into the cognitive aspects of translation as a complex mental undertaking. The act of translating and the growth of translators' skills and careers are intertwined with cognitive psychology, as explored by Göpferich (2013), which delves into the functions of the human mind that avoid direct observation. These facets fall under the view of Cognitive Translation Studies [CTS], a field that encompasses the cognitive dimensions of communicative production, reception, and interaction among all participants in multilingual events (Halverson & Martin, 2020). Moreover, critical thinking stands out as a crucial element in the practice of translation (Cheng, 2022). This skill is foundational for translators, enabling them to move beyond the superficial layer of the text and engage profoundly with its content, context, and cultural nuances. Critical thinking facilitates the creation of translations that are accurate, meaningful, and culturally sensitive, thereby establishing itself as an indispensable component of the entire translation process.

Critical thinking, attitudes and anxiety have demonstrated a favorable impact on translation proficiency in the context of AI utilization (Li et al., 2023). Nevertheless, there is a scarcity of research exploring the interplay between these elements and AI-driven translation. Additionally, only a limited number of studies have delved into the anxiety that influences translators' integration of artificial intelligence into their work. Concurrently, prevailing research has primarily concentrated on the direct consequences of factors like critical thinking and self-efficacy on translation skills or performance, without delving into and identifying the intricate psychological mechanisms unique to technological competence.

Meanwhile, existing research has predominantly cantered on the broader concept of translation competence. Many researchers have put forth components of overall translation competence and constructed models encompassing multiple factors. Some of these models have integrated technology-related sub-competences like instrumental competence, tools and research competence, and technology itself. However, there has been limited focus on identifying the effect of attitudes and anxiety towards AI among translators in Saudi Arabia.

The study aims at examining the specific elements of translators' use of AI in translation. It also explores the relationship between critical thinking, anxiety, attitudes towards using AI in translation. To address the gap in the existing studies, the current study seeks to answer the following question:

RQ) How do critical thinking, anxiety, and attitudes systematically interact with the AI-based translation?

2. Literature Review

2.1. AI and Translation

In recent years, notable progress has taken place in translation technology, driven by swift advancements in computer science, information technology, and artificial intelligence. These technological improvements have led to the development of increasingly sophisticated and effective language and translation systems. These advanced systems serve as effective tools for improving translation performance. Despite not being initially designed for translation, AI tools like ChatGPT have exhibited impressive technical prowess, generating translations that rival or even exceed dedicated translation systems in the market, such as Google Translate and DeepL (Lee, 2023). This paradigm shift can be attributed to the integration of sophisticated algorithms, machine learning techniques, and neural network architectures within these AI-powered tools (Soori et al., 2023). As a result, they exhibit an unprecedented ability to understand context, distinctions, and idiomatic expressions in various languages. The success of these AI tools in the field of translation highlights the broader impact of advancements in computer science and artificial intelligence on diverse fields. The increasing effectiveness of AI-driven translation systems not only signifies the maturation of technology but also opens new possibilities for cross-lingual communication, content localization, and global collaboration (Gutierrez, 2024). The continuous refinement of these systems holds promise for breaking down language barriers and

fostering greater connectivity in an increasingly interconnected world. As technology continues to progress, it is likely that translation tools will further evolve, providing more accurate and natural translations, ultimately facilitating seamless communication across diverse linguistic landscapes.

Several studies have employed ChatGPT in the field of translation applications. For example, Jiao et al. (2023) examined the translation performance of ChatGPT, considering factors such as translation prompts, multilingual translation, and translation robustness. Their findings revealed that, in comparison to commercial translation tools like Google Translate for high-resource European languages, GPT-3 performed well but exhibited significant limitations for lower-resource or distant languages. The introduction of the GPT-4 engine substantially enhanced ChatGPT's translation performance, making it competitive even for distant languages. Additionally, Banat and Adla (2023) investigated the efficacy of GPT-3 in translating specialized Arabic text into English, specifically comparing its performance to human translation. The study focused on ten chapters from a specialized Arabic book with content related to a specific religious context. Both a professional human translator and GPT-3 translated these chapters, and the evaluation involved qualitative measures. The results indicated that GPT-3 generated generally understandable translations but struggled to capture nuances in cultural context. The study also highlighted that GPT-3 achieved a relatively high level of accuracy in translating specialized religious text, with scores comparable to human translations in certain instances. Furthermore, Hendy et al. (2023) evaluated GPT in the context of machine translation, exploring various dimensions such as the quality of different GPT models compared to state-of-the-art research and commercial systems, the impact of prompting strategies, robustness in the face of domain shifts, and document-level translation. The results suggested that GPT models demonstrated competitive translation quality for languages with ample resources but had limited capabilities when dealing with languages with scarce resources. The study also underscored the effectiveness of hybrid approaches, involving the integration of GPT models with other translation systems, in further enhancing translation quality.In addition, Khoshafah (2023) assessed the translation capabilities of GPT-3 by comparing its outputs to human professionals across various genres, including history, literature, media, legal documents, and scientific articles. The research indicated the effectiveness of GPT-3 for translating basic content, but its performance deteriorated with complex texts requiring human expertise. While GPT-3 generally produced accurate translations, its suitability for critical areas such as legal matters, medical reports, scientific research, and literary works remained questionable.

2.2. AI Anxiety and Translation

As artificial intelligence progresses rapidly, a prevailing trend has emerged, with individuals increasingly expressing concerns and apprehensions about AI (Waltz, 2006). These concerns primarily stem from anxiety, a common human emotion characterized by feelings of fear, concern, or unease. Whether grounded in actual or perceived threats, these worries all centre around the fundamental concept of anxiety. The term "AI anxiety" encapsulates the fear that AI systems might become uncontrollable (Johnson & Verdicchio, 2017). AI has the potential to evoke various anxieties, encompassing fears of job displacement and privacy infringements (Chopra & White, 2007), and concerns about safety and regulatory issues (Scherer, 2015). As AI applications expand across diverse domains, these distinct forms of anxiety inevitably arise. Looking ahead, as AI technologies continue to evolve, it is anticipated that new anxieties and safety considerations will surface. Consequently, with ongoing technological advancements, AI-related anxiety is likely to become more prevalent among the general public.

2.3. Translators' Attitudes towards AI-based Translation

Translators' attitudes towards AI-based translation are multifaceted and often shaped by various factors. While some students embrace the convenience and efficiency offered by AI tools in language translation, others have some concerns about the potential impact on language learning and cultural understanding. Some studies were conducted to explore the attitudes that translators

had about AI. For example, Carvalho et al. (2023) examined the correlation between individuals' attitudes on machine translation and tourists' characteristics, travel habits, and language mindsets. The study found that individuals deeming machine translation less crucial are inclined to have acquired formal language skills. Also, Kirov and Malamin (2022) found that there was no justification for pessimistic scenarios predicting widespread job loss. Furthermore, concerns about a decline in the quality of work due to digitalization in the near future are unfounded in the field of translation. In addition, Koka (2024) examined the perspectives of chosen translation educators to gather their insights on leveraging AI to assist senior lecturers in adapting to the evolving landscape of translation pedagogy. The research revealed that senior lecturers perceived the integration of AI tools in translation pedagogy as beneficial, facilitating more effective teaching and learning experiences in the field of translation.

2.4. Critical Thinking and Translation

Critical thinking is an essential asset for translators as it enables them to delve beyond the superficial layer of a text, facilitating profound analysis and a comprehensive understanding of the text's purpose and nature (Mohseni & Satariyan, 2011). This ability empowers translators to engage in thoughtful analysis, interpretation, evaluation, and decision-making. According to Pintrich and DeGroot (1990), critical thinking involves applying previous knowledge to novel situations to solve problems, make decisions, or conduct critical assessments against established standards of excellence. The link between critical thinking and translation performance is robust, with students possessing stronger critical thinking skills consistently achieving better outcomes in translation tasks and assessments (Azin & Tabrizi, 2016; Boloori & Naghipoor, 2013; Galán-Mañas, 2016). Translators grapple with the intricate dynamics of text, readership, and the intricacies of both the source and target languages. To successfully comprehend a text's main idea and navigate this intricate interplay, translators need critical thinking skills. These skills are essential not only for understanding the central concept of the source text but also for problem-solving, making informed judgments, assimilating new ideas, and managing emotional responses (Saud, 2020).

Critical thinking, as a cognitive skill, extends beyond mere comprehension of a source text's main idea. Neubert (1997) contends that a satisfactory target text requires a critical extension of established rules of correspondence between the source and target languages. Kussmaul (1995) asserted that criticality is not an exclusive talent but a fundamental aspect of the human mind, suggesting that anyone can be critical when translating source texts into target texts. Given the pivotal role of critical thinking in the translation process and its significant contribution to grasping the concept of a text—a crucial step in translation—it is imperative to explore the correlation between critical thinking as an integral aspect of the translation process and the quality of the translated text as its final output.

The literature has substantiated a positive and noteworthy correlation between the critical thinking proficiency of translation students and their translation performance (Cheng, 2022). Many studies have been conducted to assess the influence of critical thinking on translation. For instance, Saud (2020) revealed a significant enhancement in students' translation abilities from Arabic to English due to the application of critical thinking. The results indicated that students did not sufficiently employ critical thinking skills, with deduction and induction reasoning being the most frequently utilized categories, followed by semantics. In addition, Parham and Fahim (2013) utilized the Watson-Glaser Critical Thinking Appraisal to examine translation trainees' critical thinking, revealing a significant predictive link between critical thinking and translation quality. Azin and Tabrizi (2016) also found a positive relationship between critical thinking skills. Other studies, such as Jahromi and Suzani (2016) further supported this association, showing that critical thinking, particularly deductive and inductive reasoning, significantly predicts translation performance. Ghaemi and Sadoughvanini (2020) extended this understanding, correlating higher-order thinking skills, including analyzing and creating, with translation quality. They argued that these skills impact the number and nature of translation errors, with 'analysis' contributing to

extra-linguistic knowledge and 'creating' connecting new evidence for innovative reasoning in translation. Also, Liu (2019) explored the reciprocal relationship between critical thinking and translation tasks among translation students. While highlighting the significance of critical thinking on translation performance, Liu underlined the need for a holistic approach in translation education to foster critical thinking in students engaged in various aspects of the translation process.

Possessing a robust set of critical thinking skills empowers translators to discern disparities between machine translation and human translation and to comprehend the implications of employing language-specific translation technologies in diverse cultural contexts (Li et al., 2023). Such skills allow them to assess the effectiveness of translation technology, explore potential applications, and formulate strategies to ensure its successful implementation. Moreover, students with well-developed critical thinking abilities are better equipped to recognize and avoid potential pitfalls when using translation technology, such as translating incorrect content or misinterpreting a text due to language-specific nuances. The capacity to identify patterns, establish connections between texts, and accurately anticipate future outcomes (Lv et al., 2022) enables them to make informed decisions that contribute to the success of translation technology projects. Ultimately, strong critical thinking skills empower students to devise novel approaches to translation technology and propose innovative solutions to existing translation challenges. This may involve creating new tools or techniques to enhance the accuracy of machine translation or devising more efficient workflows for human translation. Several studies (e.g., Rico & González Pastor, 2022; Yang & Wang, 2023) have indicated a direct impact of critical thinking on the translation technology competence of college students.

2.5. Anxiety, Critical Thinking, and AI-powered Translation

Baes on the rapid advancement in AI, anxiety, critical thinking, and AI-powered translation are intertwined components. The progress of technology has rendered AI-powered translation tools essential for overcoming language barriers and facilitating global communication. However, the widespread dependence on these tools has the potential to instigate anxiety (Mokyr et al., 2015), particularly regarding concerns related to accuracy, privacy, and job displacement.

In examining the complex interplay between translators' perceptions, emotions, and cognitive processes in the field of artificial intelligence and machine translation, this study puts forth several hypotheses to elucidate the relationships among key variables. Hypothesis 1 posits that translators' AI anxiety, stemming from concerns about the use and implications of AI, has a positive and significant impact on their critical thinking abilities. Hypothesis 2 asserts that translators' general attitude, encompassing their predispositions and sentiments, exerts a positive and significant influence on their AI anxiety. Hypothesis 3 suggests that translators' general attitude also positively affects their critical thinking skills. Hypotheses 4 and 5 propose that translators' attitude has a positive impact on their MT anxiety, and, reciprocally, MT anxiety influences their AI anxiety. Hypothesis 6 posits that translators' MT anxiety positively impacts their critical thinking capabilities. These hypotheses form the foundation for a comprehensive investigation into the intricate relationships among translators' attitudes, anxieties related to AI and MT, and their critical thinking skills. These hypotheses are listed as follows:

Hypotheses

H1: Translators’ AI anxiety has a positive and significant impact on their critical thinking.

H2: Translators’ Attitude has a positive and significant impact on their AI anxiety.

H3: Translators’ Attitude has a positive and significant impact on their critical thinking.

H4: Translators’ Attitude has a positive and significant impact on their MT anxiety.

H5: Translators’ MT anxiety has a positive and significant impact on their AI anxiety.

H6: Translators’ MT anxiety has a positive and significant impact on their critical thinking.

3. Methods

This research employs a quantitative approach to collect and analyze data. The quantitative method utilized in this study entails gathering numerical data through a structured questionnaire.

3.1. Participants

A total of 145 student translators from various universities in Saudi Arabia, all with a comparable degree of translation proficiency, participated in this study. All participants were native Arabic speakers and specialized in disciplines related to English. The present study exclusively recruited college seniors to ensure their participation in relevant classes and their familiarity with AI-based translation technology.

3.2. Measures

The study used a 5-Likert scale questionnaire as a main data collection tool (See Appendix A). The questionnaire items utilized in this study were adapted from established scales previously validated by Sosu (2013), and Wang and Wang (2022). The comprehensive questionnaire comprised four constructs: AI anxiety (12 statements), Machine Translation Anxiety (12 statements), attitude (11 statements), and critical thinking (9 statements), all designed to explore the proposed hypotheses. This specific scale is created to assess the anxiety individuals may experience in relation to artificial intelligence, providing a valuable tool for evaluating and quantifying this distinct form of anxiety when interacting with or encountering AI technologies.

3.3. Procedure and Data Analysis

The questionnaire was distributed to students enrolled in translation departments across various Saudi universities. Before participating, students were briefed on the research's background, objectives, and the confidentiality and anonymity of their responses. They gave written informed consent before proceeding to fill out the questionnaire online using Google Forms. The ethical approval was obtained for the study from University of Bisha Research Committee. The data collected from the questionnaire underwent analysis using SPSS 27 for data processing and correlation analysis. Additionally, SmartPLS 4 was utilized to conduct confirmatory factor analysis and structural equation modeling.

4. Results

Regrading use of Artificial Intelligence in translation, the participants were asked about their use of Artificial Intelligence in translation. About 33.8% of the participants reported that they were always utilizing AI in translation. 58.6% of participants reported that they sometimes used AI in translation, and 7.6% of them reported that they seldom used AI in translation.

4.1. Model Fit

The findings from the assessment of the research model's fitting index demonstrated that the model of the current study had a reasonable fit. Table 1 shows these values.

Table 1
Model fit

χ^2	*df*	*p*	*CFI*	*AIC*	*SRMR*	*NFI*	*RMSEA*
174.11	3	.000	.56	88.142	0.242	0.87	.39

The results presented in Table 1 suggested an evaluation of the overall fit of a statistical model. The chi-square statistic is a measure of the difference between the observed and expected values in a statistical model. The χ^2/df ratio was given as 174.11. A low χ^2/df ratio was indicative of a better fit. In this case, the provided value was not explicitly labeled as low or high, but a p-value of 0.00 suggested that the model significantly deviated from the expected values. A p-value less than the commonly used threshold of 0.05 (p=0.05) indicated that the model did not fit well. RMSEA is

a measure of how well the model fits the observed data, with lower values indicating better fit. The RMSEA value was reported as 0.39. Generally, an RMSEA value below 0.05 is considered a very good fit, between 0.05 and 0.08 is considered a reasonable fit, and above 0.1 indicates a poor fit. In this case, the RMSEA of 0.39 suggested a reasonable fit. Comparative Fit Index [CFI] is another measure of goodness of fit, ranging from 0 to 1, with higher values indicating a better fit. The CFI value is given as 0.56. A CFI value below 0.90 is often considered indicative of a poor fit, and a value close to or above 0.95 is considered good. The reported CFI of 0.56 suggested a relatively poor fit in this case. Standardized Root Mean Square Residual [SRMR] measures the average standardized difference between the observed and predicted correlations. The SRMR value was reported as 0.242. SRMR values close to 0 indicate a good fit, with a common threshold of 0.08 or lower. The provided SRMR of 0.242 suggests a less optimal fit.

4.2. Validity and Reliability

Confirmatory factor analysis was carried out using SmartPLS 4. Items exhibiting a loading factor surpassing 0.5 were considered to significantly contribute to the corresponding construct. Table 2 illustrates that numerous items had factor loadings within an acceptable range of 0.5 to 0.93, with only six items falling below the 0.5 threshold.

Table 2
Factor Loadings of the Items

Statement	*Factor loading*	*Statement*	*Factor loading*
statement 1	0.359	statement 23	0.903
statement 2	0.598	statement 24	0.856
statement 3	0.739	statement 25	0.852
statement 4	0.850	statement 26	0.887
statement 5	0.577	statement 27	0.652
statement 6	0.376	statement 28	0.600
statement 7	0.373	statement 29	0.856
statement 8	0.800	statement 30	0.678
statement 9	0.560	statement 31	0.895
statement 10	0.848	statement 32	0.899
statement 11	0.815	statement 33	0.927
statement 12	0.936	statement 34	0.725
statement 13	0.709	statement 35	0.710
statement 14	0.673	statement 36	0.678
statement 15	0.667	statement 37	0.842
statement 16	0.909	statement 38	0.501
statement 17	0.445	statement 39	0.837
statement 18	0.381	statement 40	0.197
statement 19	0.685	statement 41	0.830
statement 20	0.812	statement 42	0.751
statement 21	0.799	statement 43	0.855
statement 22	0.886	statement 44	0.684

Cronbach's alpha was frequently utilized to assess the internal consistency of scales. Generally, a Cronbach's Alpha above .7 is considered acceptable. As indicated in Table 3, the Cronbach alpha values for each subscale were consistently higher than .8, varying from .87 to .93. This indicates that the scales demonstrated reliable consistency.

Construct validity was examined through an evaluation of convergent and discriminant validity. In addition, Composite reliability assesses the reliability of the measurement model, similar to Cronbach's Alpha. All values, ranging from .877 to .948, indicate high reliability for all variables. Composite reliability (rho_c) is another measure of reliability. Similar to composite reliability (rho_a), these values also suggest strong reliability for each variable in this study. Also,

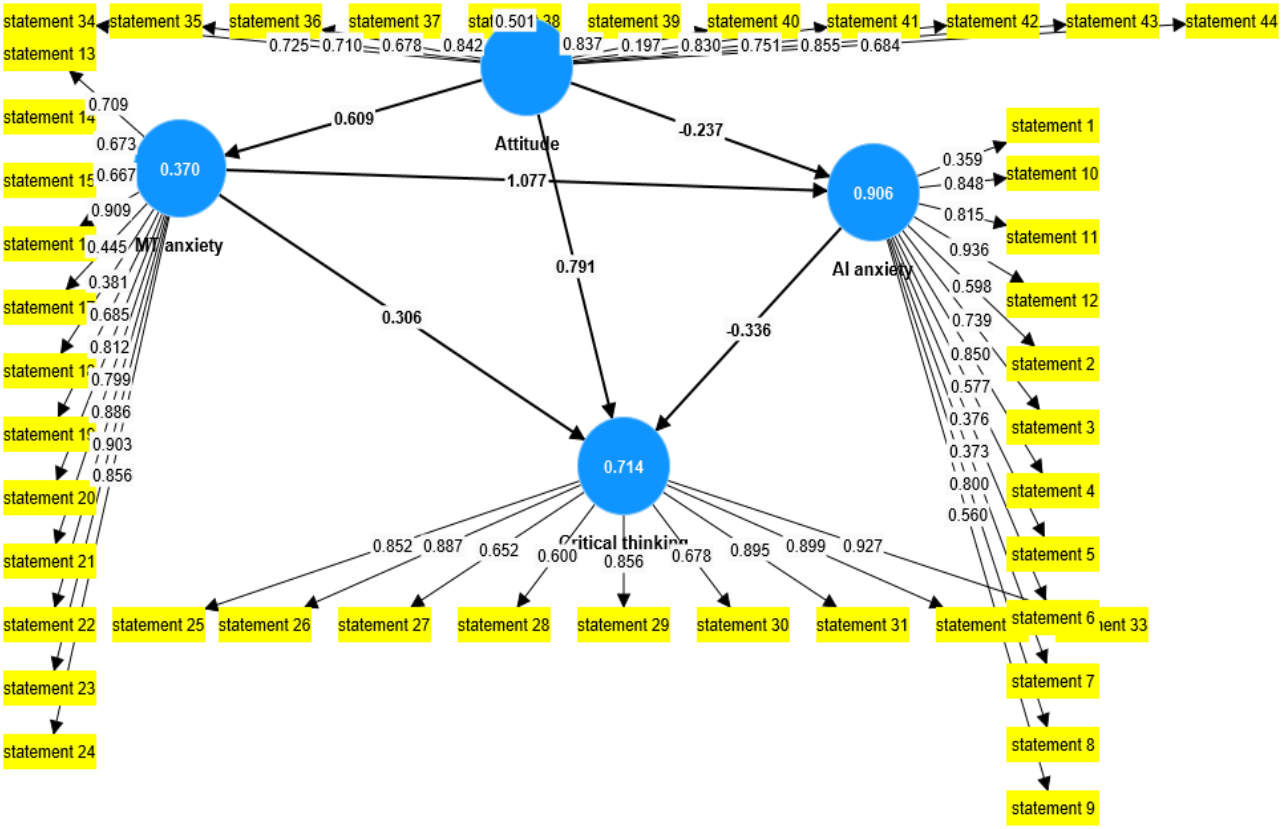
Average Variance Extracted assesses the amount of variance captured by the latent variable in relation to the amount due to measurement error. AVE values above 0.5 are generally considered good. With exception to AI Anxiety (AVE= 0.465), other variables got values above 0.5. These values indicated strong convergent validity for the scale

Table 3
Construct reliability and validity

	Cronbach's alpha	*CR (rho_a)*	*CR (rho_c)*	*AVE*
AI anxiety	0.877	0.877	0.905	0.465
Attitude	0.894	0.912	0.915	0.513
Critical thinking	0.933	0.946	0.945	0.662
MT anxiety	0.921	0.948	0.935	0.556

SmartPLS 4 was used for structural equation modeling and path analysis to test the proposed hypothesis (see Figure 1).

Figure 1
Results of the path analysis



A summary of the results of hypothesis testing for direct effects is provided in Table 4.

Table 4
Path coefficients

Relationship	*Path*	*Decision*
AI anxiety → Critical thinking	−0.336	Rejected
Attitude → AI anxiety	−0.237	Rejected
Attitude → Critical thinking	0.791	Supported
Attitude → MT anxiety	0.609	Supported
MT anxiety → AI anxiety	1.077	Supported
MT anxiety → Critical thinking	0.306	Supported

Table 4 shows that there was a negative relationship between AI anxiety and critical thinking, with a coefficient of −0.336. As AI anxiety increases, critical thinking tended to decrease. Also, there was a negative relationship between attitude and AI anxiety, with a coefficient of -0.237. A more positive attitude was associated with lower levels of AI anxiety. There was a strong positive relationship between attitude and critical thinking, with a coefficient of 0.791. A more positive attitude was strongly associated with higher levels of critical thinking. There was a positive relationship between attitude and MT (Machine Translation) anxiety, with a coefficient of 0.609. A more positive attitude was associated with higher levels of MT anxiety. There is a positive relationship between MT anxiety and AI anxiety, with a coefficient of 1.077. Higher levels of MT anxiety were associated with higher levels of AI anxiety. There was a positive relationship between MT anxiety and critical thinking, with a coefficient of 0.306. Higher levels of MT anxiety were associated with higher levels of critical thinking.

4.3. Correlations

Results regarding the correlations between the constructs and the actual use of AI are as presented in Table 5.

Table 5
Correlations between the constructs and the actual use of AI

		Use
AI Anxiety	Correlation Coefficient	.496**
	Sig. (2-tailed)	.000
MT Anxiety	Correlation Coefficient	.498**
	Sig. (2-tailed)	.000
Critical thinking	Correlation Coefficient	.655**
	Sig. (2-tailed)	.000
Attitude	Correlation Coefficient	.407**
	Sig. (2-tailed)	.000

Note. **. Correlation is significant at the 0.01 level (2-tailed).

The correlation analysis provides insights into the relationships between AI use and other variables of this study (i.e., AI Anxiety, MT Anxiety, Critical Thinking, and Attitude). Table 5 shows that there were moderate positive correlations between use of AI and other variables. The correlation coefficients ranged from 0.40 to 0.65. The results of the correlation analysis, highlighted moderate positive correlations between the use of AI and other variables in the study, suggested a meaningful connection between individuals' engagement with AI and their attitudes, anxieties, and cognitive processes.

5. Discussion

The main contribution of the current study is that it focuses on the factors that may affect the integration of AI in translation. The results of this study shed light on the complicated relationship between attitude, anxiety, and critical thinking within the field of artificial intelligence and machine translation. The finding of a negative relationship between AI anxiety and critical thinking suggests that increased anxiety about AI may hinder an individual's ability to engage in critical thinking. This could be attributed to fear or apprehension impeding one's cognitive processes. Addressing AI anxiety might, therefore, be a key factor in promoting effective critical thinking skills, facilitating a more informed and rational approach to AI technologies. The negative relationship between attitude and AI anxiety indicates that a positive attitude towards AI is associated with lower levels of anxiety. This aligns with psychological theories that suggest positive attitudes can act as a barrier against anxiety. Fostering positive attitudes through education and awareness programs may be essential in overcoming AI-related anxiety. The strong positive relationship between attitude and critical thinking implies that individuals with a favorable attitude towards AI are more likely to engage in critical thinking. This suggests that a

positive mindset towards technology may enhance one's ability to analyze and evaluate information critically. Encouraging a positive view of AI could, therefore, contribute to the development of robust critical thinking skills. The positive relationship between attitude and MT anxiety implies that a positive attitude towards MT may coexist with increased anxiety about machine translation technologies. This paradoxical relationship warrants further investigation into the specific aspects of attitude that contribute to both positive perceptions and anxiety towards MT. The positive relationship between MT anxiety and AI anxiety suggests a connection between concerns about machine translation and broader anxieties related to artificial intelligence. Understanding the shared components of anxiety in these domains is crucial for developing targeted interventions to alleviate apprehensions about AI technologies.

The positive relationship between MT anxiety and critical thinking implies that individuals with higher anxiety about machine translation may also exhibit enhanced critical thinking skills. This unexpected finding prompts further inquiry into the mechanisms by which anxiety may contribute to heightened cognitive processing and analytical abilities.

The range of correlation coefficients, spanning from 0.40 to 0.65, indicates varying degrees of association, providing valuable insights into the interplay between AI use and the examined psychological constructs. The strong positive correlation between AI use and AI anxiety implies that increased engagement with AI technologies is associated with higher levels of anxiety. This finding may be reflective of concerns or uncertainties surrounding the use of AI, suggesting that individuals who use AI more frequently may also experience increased anxiety about its implications or consequences. The moderate positive correlation between AI use and MT anxiety suggests a connection between AI use and anxiety specifically related to machine translation. This correlation implies that as individuals utilize AI more, there may be an associated increase in anxiety related to machine translation technologies. The substantial positive correlation between AI use and critical thinking suggests that individuals who frequently engage with AI may also exhibit higher levels of critical thinking. This could be indicative of a positive impact of AI use on cognitive processes, encouraging individuals to think analytically and critically about the information or tasks at hand. The moderate positive correlation between AI use and attitude indicates that a more frequent use of AI is associated with a more positive attitude towards AI technologies. This positive association suggests that individuals who actively use AI may develop a favorable perception of its capabilities and contributions to various aspects of life.

The observed positive correlations underscore the need for a comprehensive understanding of how individuals' interactions with AI influence their psychological states.

The current research aligns with the results of several previous studies concerning the direct impact of critical thinking on the translation technology proficiency of college students (Azin & Tabrizi, 2016; Ghaemi & Sadoughvanini, 2020; Jahromi & Suzani, 2016; Liu, 2019; Parham & Fahim, 2013). These studies found a positive correlation between the critical thinking and translation performance. On the other hand, the findings of this study are in contrast with Saud (2020) who fund that students did not sufficiently employ critical thinking skills with some other variables such as deduction and induction reasoning. Regarding the relationship between critical thinking and AI and MT the study findings support the findings of some studies (e.g., Rico & González Pastor, 2022; Yang & Wang, 2023) who found that there was a direct influence of critical thinking on the translation technology competence of students.

6. Conclusion

The findings of the current study make a significant contribution by examining multifaceted factors influencing the integration of artificial intelligence in translation. The focus on attitude, anxiety, and critical thinking within the context of AI and machine translation [MT] has provided valuable insights into the complex relationships shaping individuals' perceptions and decision-making processes. The recognition of a negative correlation between AI anxiety and critical thinking reveals a potential obstacle to cognitive processes when confronted with increased

anxiety. Strategies aimed at alleviating AI anxiety may be helpful in fostering effective critical thinking skills, enhancing individuals' ability to engage thoughtfully with AI integration in the field of translation. The negative relationship between attitude and AI anxiety highlights the significance of cultivating positive perceptions of AI through education and awareness programs. By fostering positive attitudes, individuals may be better equipped to overcome AI-related anxiety, thereby contributing to a more conducive environment for the integration of AI in translation. The positive relationship between attitude and critical thinking suggests a reciprocal connection between a favorable mindset towards AI and enhanced analytical capabilities. Encouraging a positive view of technology, particularly AI, emerges as a potential catalyst for the development of strong critical thinking skills. The paradoxical relationship between attitude and MT anxiety poses intriguing questions about the specific aspects of attitude contributing to both positive perceptions and anxiety towards machine translation technologies. This exploration invites further investigation into the complex interplay of psychological factors, offering opportunities to tailor interventions that address conflicting attitudes towards MT. Understanding the shared components of anxiety in these domains becomes crucial for the development of targeted interventions. By discerning the common threads in anxieties related to AI and MT, strategies can be developed to alleviate apprehensions and promote a more harmonious integration of these technologies in translation practices.

7. Limitations and suggestions for Future Research

The study has some limitations. First, the study's findings may be influenced by a potential bias in the sampling process. If the participants are predominantly from a specific demographic or professional background, the generalizability of the results to a broader population, especially in the field of translation, could be limited. Therefore, future studies may recruit participants from different countries. Second, the study's cross-sectional design limits the ability to establish causation or directionality in the relationships observed. Longitudinal studies would be necessary to capture the dynamic nature of attitudes, anxieties, and critical thinking over time and to explore how changes in these variables might be influenced by AI integration in translation. Future studies may apply a three-wave, cross-lagged study approach to check the participants' attitudes in different times. Third, the reliance on self-reported measures introduces the possibility of social desirability bias, where participants may provide responses they believe are socially acceptable. Additionally, self-reported attitudes and anxieties may not fully capture the complex and nuanced nature of individuals' cognitive processes and emotional experiences. Fourth, the study may not have controlled for various external variables that could influence attitudes, anxieties, and critical thinking. Factors such as prior experience with AI, cultural differences, or specific contexts of AI use in translation may contribute to the observed correlations, but these were not systematically addressed in the analysis.

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References

Azin, N., & Tabrizi, H. H. (2016). The relationship between critical thinking ability of Iranian English translation students and their translation ability. *Theory and Practice in Language Studies*, *6*(3), 541-548. https://doi.org/10.17507/tpls.0603.12

Banat, M., & Adla, Y. A. (2023). Exploring the effectiveness of Gpt-3 in translating specialized religious text from Arabic to English: a comparative study with human translation. *Journal of Translation and Language Studies*, *4*(2), 1-23. https://doi.org/10.48185/jtls.v4i2.762

Benmansour, M., & Hdouch, Y. (2023). The role of the latest technologies in the translation industry. *Emirati Journal of Education and Literature*, *1*(2), 31-36.

Boloori, L., & Naghipoor, M. (2013). The relationship between critical thinking and performance of Iranian EFL learners on translation tests. *The International Research Journal*, *2*, 155-165.

Carvalho, I., Ramires, A. & Iglesias, M. Attitudes towards machine translation and languages among travelers. *Information Technologies in Tourism, 25,* 175–204. https://doi.org/10.1007/s40558-023-00253-0

Cheng, S. (2022). Exploring the role of translators' emotion regulation and critical thinking ability in translation performance. *Frontiers in Psychology*, *13*, 1037829. https://doi.org/10.3389/fpsyg.2022.1037829

Chopra, S., & White, L. (2007). Privacy and artificial agents, or, is google reading my email?. In M. M. Veloso (Ed.), *Proceedings of the Twentieth International Joint Conference on Artificial Intelligence* (pp. 1245-1250). IJCAI.

Galán-Mañas, A. (2016). Learning portfolio in translator training: the tool of choice for competence development and assessment. *The Interpreter and Translator Trainer*, *10*(2), 161-182. https://doi.org/10.1080/1750399X.2015.1103108

Ghaemi, H., & Sadoughvanini, S. (2020). The relationship between translation competence and higher-order thinking skills of novice translators. *Athens Journal of Philology*, *7*(4), 273-288. https://doi.org/10.30958/ajp.7-4-3

Göpferich, S. (2013). Translation competence: Explaining development and stagnation from a dynamic systems perspective. *Target. International Journal of Translation Studies*, *25*(1), 61-76. https://doi.org/10.1075/target.25.1.06goe

Gutierrez, R. (2024). Unifying linguistic landscapes: The potential of AI and nanotechnology in facilitating real-time translation. In W. Jaber (Ed.), *Artificial Intelligence in the Age of Nanotechnology* (pp. 76-97). IGI Global. https://doi.org/10.4018/979-8-3693-0368-9.ch005

Halverson, S. L. & Martin, R. M. (2020). The times, they are a-changin'. Multilingual mediated communication and cognition. In R. M. Martin & S. L. Halverson (Eds.), *Multilingual Mediated Communication and Cognition* (pp. 1-17). Routledge. https://doi.org/10.4324/9780429323867-1

Hendy, A., Abdelrehim, M., Sharaf, A., Raunak, V., Gabr, M., Matsushita, H., Kim, Y. J., Afify, M. & Awadalla, H. H. (2023). *How good are GPT models at machine translation? a comprehensive evaluation.* Arxiv. https://doi.org/10.48550/arXiv.2302.09210

Jahromi, P. P., & Suzani, S. M. (2016). A study of relationship between translation studies students' critical thinking ability and the quality of literary prose text translation. *Theory and Practice in Language Studies*, *6*(9), 1855. https://doi.org/10.17507/tpls.0609.19

Jiao, W., Wang, W., Huang, J. T., Wang, X., & Tu, Z. (2023). *Is ChatGPT a good translator? A preliminary study.* Arxiv. https://doi.org/10.48550/arXiv.2301.08745

Johnson, D. G., & Verdicchio, M. (2017). AI anxiety. *Journal of the Association for Information Science and Technology*, *68*(9), 2267-2270.

Khoshafah, F. (2023). ChatGPT for Arabic-English translation: Evaluating the accuracy. *Research Square*. Advance Online Publication. https://doi.org/10.21203/rs.3.rs-2814154/v1

Kirov, V., & Malamin, B. (2022). Are translators afraid of artificial intelligence? *Societies*, *12*(2), 70. https://doi.org/10.3390/soc12020070

Koka, N. A. (2024). The integration and utilization of artificial intelligence (AI) in supporting older/senior lecturers to adapt to the changing landscape in translation pedagogy. *Migration Letters*, *21*(S1), 59-71. https://doi.org/10.59670/ml.v21iS1.5939

Kornacki, M. (2018). *Computer-assisted translation (CAT) tools in the translator training process*. Peter Lang. https://doi.org/10.3726/b14783

Kussmaul, P. (1995). *Training the translator*. John Benjamins. https://doi.org/10.1075/btl.10

Lee, T. K. (2023). Artificial intelligence and post-humanist translation: ChatGPT versus the translator. *Applied Linguistics Review*. Advance Online Publication. https://doi.org/10.1515/applirev-2023-0122

Li, X., Gao, Z., & Liao, H. (2023). The effect of critical thinking on translation technology competence among college students: the chain mediating role of academic self-efficacy and cultural intelligence. *Psychology Research and Behavior Management*, *16,* 1233-1256. https://doi.org/10.2147/PRBM.S408477

Liu, H. (2019, October). Teaching models of translation courses aiming at fostering critical thinking skills. In C. Ma (Ed.), *2019 International Conference on Advanced Education, Service and Management* (Vol. 3, pp. 404-407). The Academy of Engineering and Education.

Lv, S., Chen, C., Zheng, W., & Zhu, Y. (2022). The relationship between study engagement and critical thinking among higher vocational college students in China: a longitudinal study. *Psychology Research and Behavior Management*, *15,* 2989-3002. https://doi.org/10.2147/PRBM.S386780

Mohseni, A., & Satariyan, A. (2011). The relation between critical thinking and translation quality. *Journal of Language and Translation*, *2*(2), 23-32.

Mokyr, J., Vickers, C., & Ziebarth, N. L. (2015). The history of technological anxiety and the future of economic growth: Is this time different? *Journal of Economic Perspectives*, *29*(3), 31-50. https://doi.org/10.1257/jep.29.3.31

Neubert, A. (1997). Postulate for a theory of translation. In J. Danks et al. (Eds), *Cognitive process in translation and interpreting* (pp. 250–268). Sage.

Parham, F., & Fahim, M. (2013). The relationship between critical thinking and translation quality. *Translation Studies*, *11,* 10–22.

Pintrich, R. R., & DeGroot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, 82, 33−40. https://doi.org/10.1037/0022-0663.82.1.33

Rico, C., & González Pastor, D. (2022). The role of machine translation in translation education: a thematic analysis of translator educators' beliefs. *Translation & Interpreting*, *14*(1), 177-197. https://doi.org/10.12807/ti.114201.2022.a010

Saud, W. I. (2020). The relationship between critical thinking and translation ability of EFL undergraduate students. *International Journal of Social Sciences & Educational Studies, 7*(3), 19-28. https://doi.org/10.23918/ijsses.v7i3p19

Scherer, M. U. (2015). Regulating artificial intelligence systems: Risks, challenges, competencies, and strategies. *Harvard Journal of Law & Technology*, *29*(2), 354-400. https://doi.org/10.2139/ssrn.2609777

Soori, M., Arezoo, B., & Dastres, R. (2023). Artificial intelligence, machine learning and deep learning in advanced robotics, A review. *Cognitive Robotics*, *3,* 54-70. https://doi.org/10.1016/j.cogr.2023.04.001

Sosu, E. M. (2013). The development and psychometric validation of a Critical Thinking Disposition Scale. *Thinking Skills and Creativity*, *9*, 107-119. https://doi.org/10.1016/j.tsc.2012.09.002

Waltz, D. L. (2006). Evolution, sociobiology, and the future of artificial intelligence. *IEEE Intelligent Systems*, *21*(3), 66-69. https://doi.org/10.1109/MIS.2006.46

Wang, Y. Y., & Wang, Y. S. (2022). Development and validation of an artificial intelligence anxiety scale: An initial application in predicting motivated learning behavior. *Interactive Learning Environments*, *30*(4), 619-634. https://doi.org/10.1080/10494820.2019.1674887

Yang, Y., & Wang, X. (2023). Predicting student translators' performance in machine translation post-editing: interplay of self-regulation, critical thinking, and motivation. *Interactive Learning Environments*, *31*(1), 340-354. https://doi.org/10.1080/10494820.2020.1786407

Appendix A. Questionnaire

AI Anxiety

1. I am afraid that AI will replace my job.
2. I am afraid that if I begin to use AI products, I will become dependent upon them.
3. I am afraid that it is necessary to use AI in my job.
4. I am afraid that AI may make me lazy.
5. I am afraid that AI may replace human translators.
6. Using a specific AI tool that I have never used before makes me anxious.
7. If I were to use an AI product, I would be afraid of making mistakes.
8. I am afraid that using AI in translation may produce irrelevant output.
9. I am afraid that AI may not translate difficult topics such as poems and other literary texts.
10. I am afraid that an AI may be misused.
11. I am afraid of various problems potentially associated with an AI product.
12. I am afraid that an AI may lead us to lose our creativity.

Machine Translation Anxiety

1. I am afraid that machine translation will replace my job.
2. I am afraid that if I begin to use machine translation products, I will become dependent upon them.
3. I am afraid that it is necessary to use machine translation in my job.
4. I am afraid that machine translation may make me lazy.
5. I am afraid that machine translation may replace human translators.
6. Using machine translation that I have never used before makes me anxious.
7. If I were to use machine translation, I would be afraid of making mistakes.
8. I am afraid that using machine translation in translation may produce irrelevant output.
9. I am afraid that machine translation may not translate difficult topics such as poems and other literary texts.
10. I am afraid that machine translation may be misused.
11. I am afraid of various problems potentially associated with machine translation.
12. I am afraid that machine translation may lead us to lose my creativity.

Critical thinking

1. I usually try to think about the bigger picture when I use AI in translation.
2. I use more than one source to find out information for myself.
3. I am often on the lookout for new ideas.
4. I sometimes find a good argument that challenges some of my firmly held beliefs.
5. It is important to understand other people's viewpoint on an issue.
6. It is important to justify the choices I make.
7. I often re-evaluate my experiences so that I can learn from them.
8. I usually check the credibility of the source of information before making judgements.
9. I usually think about the wider implications of a decision before taking action.

Attitudes

1. Artificial intelligence can provide new opportunities for translation.
2. Artificial intelligence systems can help people feel more confident.
3. I am impressed by what artificial intelligence can do in translation.
4. I am interested in using artificial intelligence in translation.
5. Artificial intelligence might take control of people.
6. Artificial intelligence is exciting.
7. Artificial intelligence can perform better than human translators.
8. I would like to use Artificial Intelligence in my own job.
9. Organizations use Artificial Intelligence unethically.
10. I think artificial intelligence makes many errors.
11. I think Artificial Intelligence is dangerous.