Human-AI collaboration in translation and back translation of literary texts

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Abstract:

In recent years, the significance of machine translation systems has grown due to the extensive production of online texts across various disciplines. Traditional translation methods have proven inadequate in meeting global translation needs. While translation tools are brilliant in addressing diverse disciplines and text genres, their usability and reliability face considerable debate, especially when applied to literary texts. Therefore, this research seeks to explore the impact of Artificial Intelligence (AI) translation tools (e.g., ChatGPT) on the translation and back translation of literary texts. The study employed an experimental model within a qualitative approach, utilizing a translation test as the primary research tool. 80 English-major students at Imam Mohammed Ibn Saud Islamic University (IMSIU) were randomly selected and assigned into four groups: two control and two experimental groups. Students are asked to translate and back translate an English short story and qualitative data from the test has undergone analysis through various comparisons. For statistical analysis, an independent samples t-test was employed to compare two independent groups. The findings revealed that students using AI tools were able to produce better translations and back translations than students using traditional methods, with slightly better performance in back translation.

Keywords: *back translation; AI-based machine translation; ChatGPT; translation of literary texts; translation flows*

التعاون بين الإنسان والذكاء الاصطناعي في الترجمة والترجمة العكسية للنصوص الأدبية

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الملخص:

نظراً للازدياد المكثف في إنتاج النصوص عبر الإنترنت في التخصصات المختلفة في الآونة الأخيرة فقد زادت أهمية أنظمة الترجمة عبر الآلة، لا سيما وأن أساليب الترجمة التقليدية أثبتت عدم قدرتها على تلبية احتياجات الترجمة العالمية، ورغم أن أدوات الترجمة الآلية رائعة في معالجة النصوص المختلفة في التخصصات المتنوعة، إلا أن قابليتها للاستخدام وموثوقيتها تواجه جدلًا كبيرًا، خاصة عند تطبيقها على النصوص الأدبية. ولذلك، يسعى هذا البحث إلى استكشاف تأثير أدوات الترجمة باستخدام الذكاء الاصطناعي (مثل ChatGPT) على الترجمة والترجمة العكسية للنصوص الأدبية. استخدمت الدراسة نموذجًا تجريبيًا ضمن منهج نوعي، باستخدام اختبار الترجمة كأداة بحث أساسية، وقد تم اختيار 80 طالبًا من طلاب تخصص اللغة الإنجليزية في جامعة الإمام محمد بن سعود الإسلامية (IMSIU) عشوائيًا وتم تقسيمهم إلى أربع مجموعات: مجموعتان ضابطتان ومجموعتان تجريبيتان، حيث طلب من هؤلاء الطلاب ترجمة قصة قصيرة من اللغة الإنجليزية إلى العربية ثم ترجمة النص العربي إلى اللغة الانجليزية مرة أخرى، وقد خضعت البيانات النوعية من الاختبار للتحليل من خلال مقارنات مختلفة، وتم استخدام اختبار t للعينات المستقلة لمقارنة مجموعتين مستقلتين في التحليل الإحصائي، وقد أظهرت نتائج الدراسة أن الطلاب الذين يستخدمون أدوات الذكاء الاصطناعي كانوا قادرين على إنتاج ترجمات وترجمات عكسية أفضل من الطلاب الذين يستخدمون الأساليب التقليدية، مع أداء أفضل قليلاً في الترجمة العكسية.

الكلمات المفتاحية: ***الترجمة العكسية، ترجمة الآلة القائمة على الذكاء الاصطناعي، تشات جي بي تي، ترجمة النصوص الأدبية، اتجاهات أو تدفقات الترجمة***

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Introduction

Presently, artificial intelligence plays a pivotal role in translation processes, prompting numerous studies to assess its impact on students' translated texts. Wang (2023) sought to discern the pros and cons of AI versus human translations, revealing the profound influence of AI development on the translation industry. To optimize translation outcomes in the rapidly evolving AI landscape, fostering Human-AI partnerships is essential. In a related vein, Sun (2023) proposed an AI translation method grounded in semantic analysis for navigating English fuzzy semantics in vocabulary and literature. Experimental results showcased the efficacy of this approach in circumventing semantic ambiguity and enhancing the precision of English language translation.

Indeed, the emergence of Artificial Intelligence (AI) in linguistic translation has revealed novel possibilities portending to span communication chasms and enable more fruitful cross-cultural connections (Yasir et al, 2024, p.1). According to Yasir et al, recently, remarkable advancements have been made in the domain of machine translation (MT), and the prominence of MT has increased due to the need to comprehend the vast array of information accessible on the Internet in several languages as well as the heightened level of international commerce (p. 25553-4). Lan Wang (2023) studied the impacts and challenges of Artificial Intelligence translation tool on translation professionals. The study attempted to show how the evolution of AI has affected translation by contrasting the pros and cons of machine and human translation. The study pointed out that the development of artificial intelligence (AI) translation has had a definite impact on translation works. The authors conclude that humans can almost avoid mistakes with the help of relevant tools such as dictionaries. Their findings further showcase that, although AI can help with basic grammatical analysis, human translators may compensate for the shortcomings of AI by recognizing connotations and logical frameworks. They promoted a balanced strategy that makes use of AI’s effectiveness while still valuing human translators’ contributions to the final product.

Translating a literary text diverges from the translation of other types of texts. In the process of translating a literary work, the translator is often required to surpass the literal content and delve into conveying the precise intended meaning of the author. In addition to convey the surface meaning, the translator must adeptly capture cultural nuances, stylistic elements, and the overall essence of the original piece. Literary texts possess distinct characteristics that set them apart from other textual forms, and these unique aspects need to be considered during the translation process. Sherzodovich and Jamshedovich's (2021) exploration into the nature of literary texts as subjects of translation endeavors identified key features. Their study highlighted that a successful literary translation should meet essential criteria such as accuracy, conciseness, clarity, and literary finesse.

Back translation is a valuable and widely used technique in translation studies and natural language processing. It helps improve the quality of translations, identify errors, and enhance the cultural sensitivity of translated content. It also helps in identifying cultural nuances that may not have been accurately conveyed in the initial translation. Researchers and practitioners continue to explore ways to leverage back translation for the development and refinement of translation models. They assured that the iterative feedback process, made by back translation, enables translators to make essential corrections, thereby improving the overall quality of the translated material. It can be used with any type of texts, including literary texts. Lane (2020) indicated that literary back translations are created when translations are returned to the language of their source text.

Apart from the fact that back translation can be performed for most types of creative writing tasks including literature, prose, poetry, and magazines to give an accurate depiction of the exact meaning, back translation strategy can be also used as an effective strategy for the development of language skills and personal traits of EFL learners. Maged Mohammedain (2021), for instance, investigated the effectiveness of a proposed unit based on the back-translation strategy to develop creative writing skills and academic self-efficacy among English Department first-level students. His study revealed that the proposed unit based on the back translation helped to develop creative writing skills and academic self-efficacy among learners. According to Bernadine (2016), the use of back translation strategy is beneficial to EFL learners because it provides them a deeper insight into the rendition of materials at hand; facilitate understanding of the differences between both the source and target languages; and suggest broader recommendations for language acquisition. Indeed, translation is based on the writing skills of the translator and the ability to use a clear and simple writing style in order to transmit the accurate meaning of the original text including facts, tone, message and intent of the writer as accurately as possible.

Accordingly, the current study aims at identifying the impact of AI-based machine translation on the process of translation and back translation of literary texts. It also aims to identify whether there is a difference in the translation quality due to reverse translation (English into Arabic and Arabic to English). In other words, it aims to answer the following questions:

1) What is the impact of AI-based machine translation on the quality of students' translation of literary texts?
2) What is the impact of AI-based machine translation on the quality of students' back translation of literary texts?
3) What are the comparative outcomes between the two experimental groups and two control groups, each utilizing AI-driven machine translation and traditional methods respectively, but with differing translation flows or reverse translations (Arabic into English and English into Arabic)?

Literature Review

AI-based Machine Translation and Literary Texts

Machine translation is a language processing tool that is widely used nowadays (Li and Hao, 2021). All forms of Machine translation have been the subject of research for a very long time. It involves the use of computer programs to translate text from one language into another automatically (Ke Ping, 2009). According to Kirov and Malamin (2022), AI is defined as a part of computer science in its aspect of machine imitating human intelligence in the form of resembling human intelligence and not being human. Translating literary texts creates unique challenges compared to other genres as it contains cultural references and stylistic features that require profound understanding of both the source and target language. AI-based Machine translation has witnessed significant advancements in recent years, transforming the way we approach the translation of literary texts. However, AI-based translation might be unable to capture the nuances and literary features of the source text which will eventually impact the quality of the translation. According to Liu and Li (2023) "the main challenge in AI. based translation comes from the difficulties in understanding the semantics of texts as well as understanding the syntactic structure of texts to translate them." Over the past two decades, numerous studies have been undertaken to assess the role and challenges associated with machine translation in the context of translating literary texts. For instance, Omar and Gomaa (2020) investigated the application of machine translation systems to literature to identify challenges that could adversely affect the reliability of such systems. Their findings indicated that users encounter various lexical, structural, and pragmatic errors, undermining the dependability of these translations. Matusov (2019) delved into the challenges of employing neural machine translation (NMT) in literary translation. The researcher applied cutting-edge NMT systems to literary content, translating fiction stories from English to Russian and from German to English. Results showed that up to 30% of machine-translated sentences exhibited acceptable quality. While severe syntactic errors were rare, numerous meaning errors for ambiguous words persisted. A distinct classification of consistency, pronoun resolution, and tone/register error types underscored the potential for enhancing machine translation quality by considering the context of previous sentences or even the entire narrative.

A number of other scholars were addressing the ethical concerns that need to be considered when employing machine translation for the translation of literary works. LI (2023) delved into emerging ethical issues in literary translation, such as the professional identity of literary translators and copyright concerns. Given that AI-enabled literary translation involves issues of copyright in training data and participatory NMT, this study indicated that technological progress will facilitate literary translation. Yet, it found no direct evidence supporting the idea that machine translation will supplant human translators. Taivalkoski-Shilov (2019) explored crucial ethical considerations when adopting or customizing technological tools for literary

translation. The study highlighted the concept of voice as an example of unique challenges in the translation of literary language, an aspect insufficiently addressed in research on machine-assisted translation of literary content.

Further research explored the efficacy of employing artificial intelligence in translating literary texts. Alowedi and Al-Ahdal (2023), for example, examined disparities between an AI-based machine translation (MT) and a human translation of Arabic poems into English. Results demonstrated that the AI-based MT fell short in capturing the cultural context of the original poem. The use of different adjectives in the AI-based MT led to a meaning distinct from the original, highlighting the AI's limitation in applying meaning beyond its database and comprehending the cultural context of the poetry. Consequently, it is inferred that AI-based MT may not be a suitable tool for translating Arabic poetry into English.

Back Translation

"Back translation" is a commonly employed technique in the fields of translation studies and natural language processing. This method involves translating a text from one language to another and then translating it back to the original language. The primary purpose of this process is to assess the quality of a translation and pinpoint areas where improvement may be needed. However, recent research suggests that the utility of back translation extends beyond quality control. Back translation according to Brislin and Freimanis (2001) is important in assessing the quality of a translation since the translator cannot read the target version and therefore make a judgment on the quality of the translation. Tyupa (2011) sees back translation as validation tool which is commonly used in research settings including cross-cultural and educational research.

According to Son (2018), back translation can serve as a valuable documentation tool rather than just a quality control measure. Son proposed a baseline for utilizing back translation in this capacity, offering examples of both "good" and "bad" back translations. The study highlighted that back translation's value is further underscored by recent studies that have successfully integrated it into their documentation processes. While its role as a quality control tool may be considered outdated, back translation still holds potential for meaningful applications as a documentation tool.

Edunov et al. (2018) see back translation as an effective method to improve machine translation with monolingual data to enhance the parallel training corpus with back translation of target language sentences.

Other scholars explored the aspects of back translation, focusing on the variations that might occur when translating text back to its original language. In Klaudy's (1996) investigation, the goal was to determine whether explications in Hungarian-English translation remained intact in the English-Hungarian back-translation. The findings revealed that explications made during Hungarian-English translation were frequently retained in the English-Hungarian back-translation, even when it might have been appropriate to omit or delete them.

Sun (2014) went through cases where Chinese American literature incorporates cultural elements from both "native" Chinese culture and American literary tradition. Through the process of back translation, Sun explored how Chinese raw material, once translated into English, becomes integrated into American literature, resulting in the creation of Chinese American literary texts. When some of these texts are then translated back into Chinese, they exhibit a distinct linguistic and cultural displacement. The results indicated that the translation and re-translation processes not only highlighted the unfamiliar aspects of Chinese culture but also showcased its creative assimilation into American literature.

Mujiyanto (2016) aimed to evaluate the equivalence of reading ease and grade level, indicators between source texts and their translations, including back-renderings. The translations were subsequently back-rendered to the source language using Google Translate. A comparison between the source texts and their translations, as well as the back-renderings, demonstrated similarities in readability levels and average counts of characters, words, sentences, and words per sentence in the texts.

Methods

Research Design

The present research employs an experimental design and utilized a qualitative approach for data collection and analysis. Qualitative research is an investigative method frequently used to understand human behaviour or comprehend social phenomena. In this study, sticking to the qualitative approach, data was obtained through a translation test administered to participants in both control and experimental groups.

Participants

The study included a group of eighty students selected at random, with their consent, from levels 7 and 8 within the English Departments at Imam Mohammed Ibn Saud Islamic University (IMSIU). This research was scheduled to occur in the second semester of the academic year 2023/2024. The choice of levels 7 and 8 was based on the expectation that these students have already possessed knowledge of back translation and have been proficient in utilizing both machine and artificial intelligence in their translation tasks. All participants were assumed to have completed six semesters in the English department, in addition to completing six years of English education at intermediate and secondary schools.

Measures

In this study, a single measurement instrument, namely a test, was employed. The test consists of a single question, in which students were presented with a short story and were asked to translate that short story into the target language. Their second task will be to re-translate the story back into its original form (the source language). The selected short story "Gateway" was about travel in starship Prelude, to create a new world. The only contact between the new world and the earth was through the

portholes. It was a science fiction story in which the writer warned people who went behind technology without understanding its consequence.

Procedure and Data Analysis

The eighty students were randomly assigned to four groups: a control translation group (from English into Arabic), an experimental translation group (from English into Arabic), a control back translation group (from Arabic into English), and an experimental translation group (from Arabic into English). The control group undertook the translation test manually whereas the experimental group utilized artificial intelligence assistance (specifically Chat GPT). Evaluations of the students' responses were conducted using specific rubrics. Consequently, the results from the four groups were compared to address the three research questions. For the first question, a comparison was made between the control translation group and the experimental translation group; for the second question, a comparison was made between the control back translation group and the experimental back translation group; to answer the third question, discrepancies between the two experimental groups and the two control groups was examined. The collected test data have been analysed using an independent samples t-test, a statistical method employed to assess whether there is a statistically significant difference in means between two independent groups.

Rubrics for Translation assessment

To evaluate the students' translations, the researchers applied the criteria established by Thabet & Qadha (2024). In their article, Thabet & Qadha (2024) concentrated on translating poetry, and the proposed assessment criteria were somewhat appropriate for this study since both poetry and short stories fall under the category of literature. The researchers chose several of these parameters and introduced three additional ones specifically relevant to short stories, which are the focus of the current study. The parameters and their definitions are as follows:

1) Accuracy of Meaning: It refers to the extent to which the translation accurately reflects the intended meaning of the original text.
2) Fluency: It pertains to how natural the translation reads in the target language.
3) Syntactic Features: It refers to the grammatical elements such as word order, sentence structure, subject-verb agreement, voice, number, gender, person, etc.
4) Cohesion & Coherence: It refers to the organization and connectivity of a translation. Coherence examines the level of thematic symmetry while cohesion focuses on elements like reference (anaphora, cataphora), ellipsis, deixis, and conjunctions.
5) Diction: It refers to the use of appropriate words choice of words to convey the meaning of the original text accurately.
6) Setting: It refers to the time and place in which the story's events occur.
7) Symbolism: In a short story, symbolism refers to the use of symbols to represent abstract ideas or concepts.

8) Theme: It refers to the underlying message or the central idea the author investigates through a short story.

Each of the eight criteria underwent evaluation using a scale of five levels (5-1). A score of 5 was assigned to the translation that best fulfilled the parameter, while a score of 1 was assigned to the translation that least fulfilled the parameter.

Results:

The study tries to answer the following three questions:

1) What is the impact of AI-based machine translation on the quality of students' translation of literary texts?

To answer the first question, the students' responses to the translation task were analyzed. The scores of the experimental and control groups were analytically calculated. The following table presents the answer of the first question.

Table 1: The scores of the control and experimental translation groups

Group	N	Mean	Std. Deviation	Std. Error Mean	T	Significance
Experimental Translation	20	32.4500	1.79106	.40049	13.913	<.001
Control Translation	20	19.8000	3.65052	.81628		

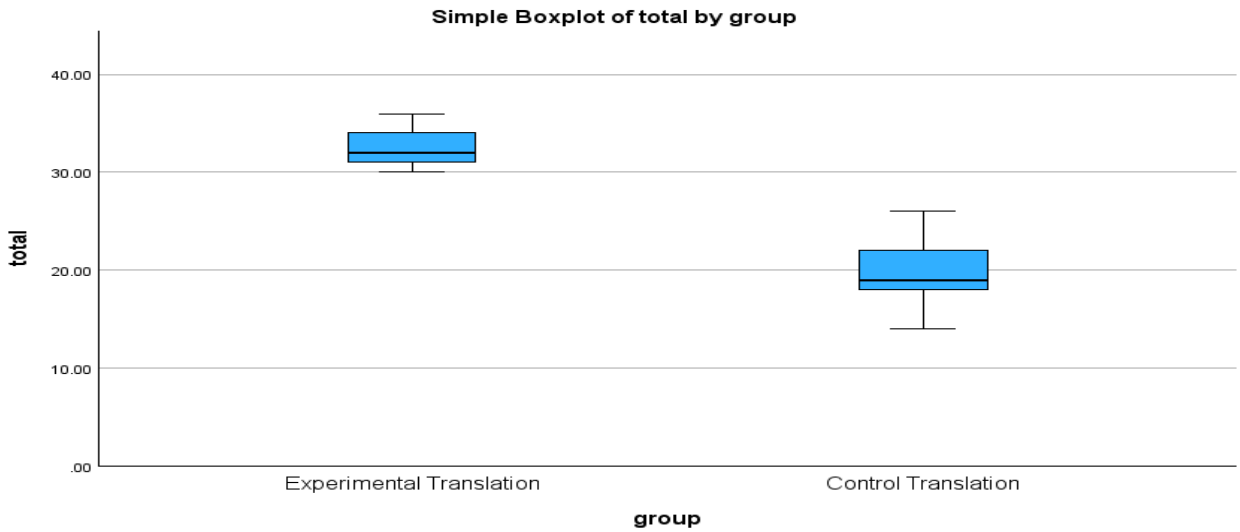

Figure 1: Control and experimental translation groups

Table 1 & Figure 1 presented the summary statistics for the scores of the control and experimental groups in the translation task. It indicated that the translation quality performed by the experimental group students, who utilized AI-based machine translation, surpassed the quality of that made by the control group students, where traditional methods were employed. Examining the table, it becomes evident that the

experimental group achieved a significantly higher mean translation quality score of 32.45 (SD = 1.79, SE = 0.40), whereas in the control group, the mean translation quality score was 19.80 (SD = 3.65, SE = 0.82).

Data from this table also showed a significant difference between the two groups, represented by the highly significant t-value of 13.913 ($p < .001$). The reliability of these findings was supported by the standard error of the mean. Thus, it can be inferred that the AI-based machine translation had a substantial positive effect on the quality of students' translation of literary texts, compared to traditional methods. This leads to the potential of AI technology to enhance translation proficiency in educational settings.

2) What is the impact of AI-based machine translation on the quality of students' back translation of literary texts?

To address the second question, a back translation test was conducted. The students of the two groups were asked to react to the back translation test. The scores from both the experimental and control groups were computed and compared. The following table illustrates the response to the second question.

Table 2: The scores of the control and experimental back translation groups

Group	N	Mean	Std. Deviation	Std. Error Mean	T	Sig.
Experimental Back Translation	20	34.8500	1.78517	.39918	16.317	<.001
Control Back Translation	20	17.3500	4.45179	.99545		

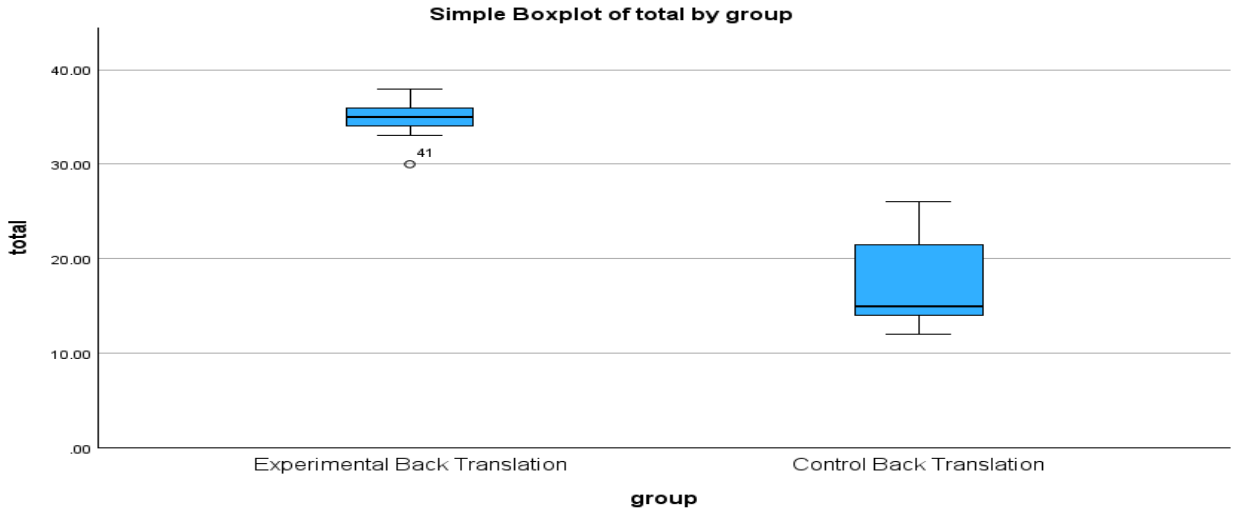

Figure 2: Control and experimental back translation groups

Table 2 & Figure 2 displayed a summary of the scores from both the control and experimental groups in the back translation task. It showed that students in the

experimental group, who used AI-based machine translation, achieved better back translation quality compared to those in the control group, who relied on traditional methods. The table also revealed that the experimental group obtained a significantly higher average translation quality score of 34.85 (with a standard deviation of 1.78 and a standard error of 0.39), while the control group's mean translation quality score was 17.35 (with a standard deviation of 4.45 and a standard error of 0.99).

The information displayed in this table also proved a notable contrast between the two groups, as evidenced by the remarkably significant t-value of 17.317 ($p < .001$). The standard error of the mean reinforced the credibility of these results. Consequently, it can be deduced that AI-driven machine translation had a considerable beneficial impact on the quality of students' literary text back translations compared to conventional methods. This suggests the promising potential of AI technology to back translation skills within educational contexts.

3) What are the comparative outcomes between the two experimental groups and two control groups, each utilizing AI-driven machine translation and traditional methods respectively, but with differing translation flows or reverse translations (Arabic into English and English into Arabic)?

To answer the third question, the scores of the two experimental groups that employed AI-driven machine translation and the two control groups that utilized the traditional methods were compared. The core of the two comparisons was to find out whether variations in translation direction (from Arabic into English and from English into Arabic) resulted in disparities between the two groups. The detailed results of this inquiry are presented in the subsequent table.

Table 3: The scores of control and experimental Groups (Reverse Translation)

Group	N	Mean	Std. Deviation	Std. Error Mean	T	Significance
Experimental Translation	20	32.4500	1.79106	.40049	-4.244	<.001
Experimental Back Translation	20	34.8500	1.78517	.39918		
Control Translation	20	19.8000	3.65052	.81628	1.903	.065
Control Back Translation	20	17.3500	4.45179	.99545		

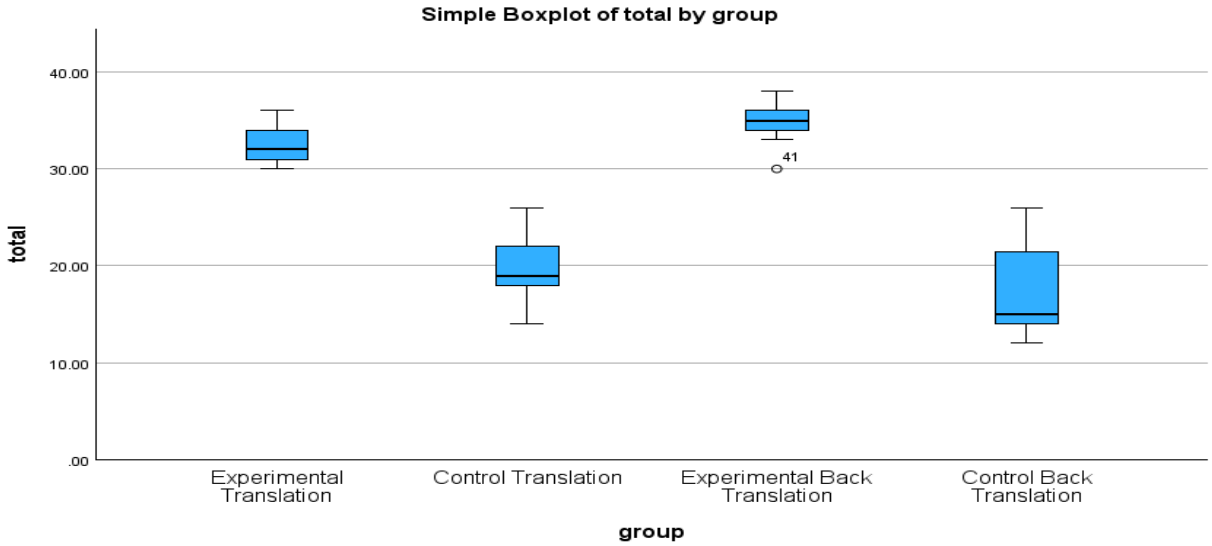

Figure 3: Control and experimental Groups (Reverse Translation)

To assess the effectiveness of reverse translation, the mean scores for each group were examined. Table 3 & Figure 3 illustrate that the participants in the experimental translation group (English into Arabic) attained a mean score of 32.45 (SD = 1.79106) while those in the experimental back translation group (Arabic to English) achieved a slightly higher mean score of 34.85 (SD = 1.78517). In contrast, the control translation group (English to Arabic) yielded a higher mean score of 19.80 (SD = 3.65052), compared to the control back translation group (Arabic to English), which demonstrated a mean score of 17.35 (SD = 4.45179).

To compare the outcomes of the two experimental groups, a paired-sample t-test was conducted. The results of the statistical analysis revealed a statistically significant difference ($t(19) = -4.244$, $p < 0.001$), indicating that participants in the experimental back translation group outperformed those in the experimental translation group. Since both groups used the AI tools, it can be ensured that that any observed differences are caused by the translation direction rather than the tools themselves.

The same test was employed to statistically analyse the results of the control groups. Although there was a noticeable difference in mean scores between the control translation and control back translation groups, the difference was not statistically significant ($t(19) = 1.903$, $p = 0.065$). This indicated that students who used the traditional methods had the same difficulties in both reverse translations.

These findings suggest that utilizing AI-driven machine translation in a reversing manner, specifically through back translation, may result in superior outcomes compared to traditional methods. However, scientists should conduct further research to explore the other factors that may lead to these obvious differences.

Discussion:

The present study is designed to investigate the impact of AI-based translation tools on the translation and back translation of literary texts. To answer the research questions, three comparisons are made: one between the scores of experimental and control translation groups, another between the experimental and control back translation groups, whereas the last one compares reverse translations between the two experimental and two control groups, separately.

The first question is inquiring about the effect of AI-based machine translation on the quality of students' translation of literary texts. To answer this question, the performance of the experimental and control groups in the translation test (translating a short story from English into Arabic) is compared. The results indicate that the performance of the experimental group (translating with the AI assistance) exceeds that of the control group (translating with the traditional way). The examples below clarify this point.

Table 4: Examples of Students' Translation with the two methods
(Translation: English into Arabic)

Original Text	Human Translation	AI-based Translation
Not that years had the same meaning for me that they did for my parents who, in their youth, could mark a year by the passing of the seasons.	1.a وليس للسنين معنى نشترك فيه أنا ووالدي لأنهما يحبان مرور السنة يمضي كل الفصول	1.b لا تحمل السنوات لدي نفس المعنى الذي كان لديه والدي ، الذين في شبابهم كانوا يستطيعون تحديد السنة بمرور الفصول
	4.a وأنا لا أهتم بالسنين مثل أهلي الذين كان في صغرهم يمررون الفصول في السنة	4.b ليس للسنوات نفس المعنى بالنسبة لي كما كانت لوالدي الذين في شبابهم كانوا يميزون السنة بمرور الفصول

Table 4 provides translations done by both humans and Artificial Intelligence. The examples illustrate that students using traditional translation methods often fail to convey the full intended meaning, as observed in examples 1.a. and 4.a. Additionally, students struggle with sentence structure in Arabic when using traditional methods, as evidenced in 1.a. and 4.a. This issue was resolved in translations made with AI tools, as shown in 1.b. and 4.b. A possible explanation for this result might be that AI translation tools provide students with high-quality translations that they can learn from. Another explanation might be related to the unique features of the AI tools. These tools have advanced algorithms and developed varied models that can be used in producing more fluent and accurate translations. Besides, AI tools can translate the text faster than humans can do so students have more time to revise and refine the translation and have better quality. The finding corporates the ideas of Mujiyanto

(2016) in which google translate proved to show readable and coherent translations from the source to the target language.

The second question asks about the impact of AI-driven machine translation on the quality of students' back translation of literary texts. To answer the second question, the scores of the experimental and control groups of the back translation test are examined. The findings suggest that the experimental group, which uses AI-driven machine translation outperforms the control group that translated in the traditional manner. This finding can be illustrated in Table 5 below:

Table 5: Examples of Students' Translation with the two methods

(Back Translation: Arabic into English)

Original Text	**Human Translation**	**AI-based Translation**
كانت مهمة سفينتنا الفضائية هي إنشاء بوابة إلى عالم آخر، وتم بالفعل تجهيز أحد طرفي الكوة على الأرض بينما كان الطرف الآخر في مخزن سفينتنا	8.a. The mission of our starship she construct a gate that lead to another world. With the verb prepared one end of the niche on the Earth, while the other end is in the store of our ship.	8.b. The mission of our spaceship was to create a gateway to another world. One end of the wormhole was already set up on Earth, while the other end was in our ship's storage.
	13.a. My primary space ships function was to create a portal into another universe we successfully created an end of each portal on earth and the other end in the ship vault.	13.b. Our spacecraft's mission was to create a portal to another world, and one end of the porthole was set up on Earth while the other end was in our ship's hold.

Table 5 displays examples of students' back translation performance. These examples reveal that the human back translations often use improper structures and lack coherence, as illustrated in 8.a. and 13.a. In contrast, the AI-based versions are significantly more coherent and freer from grammatical mistakes, as demonstrated in 8.b. and 13.b. This result may be explained by the fact that AI tools are known for using consistent phrases and fixed terminology. This consistency helps preserve the original meaning of the text. Additionally, AI tools have the ability to understand the context of the source text, so the back translation captures the intent and the tone of the original text. Furthermore, AI tools are capable to identify and correct errors that can be missed by translators. This results in reducing inaccuracies and enhancing the overall quality of back translation. This finding is in agreement with Mujiyanto (2016) in which google translate revealed readable and coherent translations when rendering

a text back from the target to the source language. In contrast, it differs from some published studies, such as Alowedi and Al-Ahdal (2023) where the authors indicated that AI-based MT may not be a suitable tool for translating Arabic poetry into English. The third question in this study seeks to determine whether there is a significant difference in performance between the experimental translation group and the experimental back translation group. It also investigates whether there is a notable performance difference between the control translation group and the control back translation group. The aim of this question is to determine if reverse translation affects the translation quality, when both experimental groups and both control groups use the same translation method, AI-based for experimental groups or the traditional method for control groups. The results to this question indicate that there is a slightly significant difference between the two experimental groups, favoring the experimental back translation. On the other hand, the results show no significant difference in the performance of the two control groups. This indicates that reverse translation affects the translation quality of students using the AI-driven tools, but it doesn't have any impact on students using the traditional method.

Table 6: Examples of Students' Translation with two different translation flows (English into Arabic & Arabic into English)

Human Translation (Control Groups)	**Original Text (Translation)**	**Translated text (Back Translation)**
The text	My parents were Jerry and Emma Stevenson, both Doctors of Philosophy in engineering, made famous by their work in developing portholes, which were supposed to save Earth from overpopulation problems.	كان والداي جيري وإيما ستيفنسون، وكلاهما دكتوراه في الهندسة، قد اشتهرا بعملهما في تطوير الكوات، التي كان من المفترض أن تنقذ الأرض من مشاكل الاكتظاظ السكاني.
Students' Responses	والدي هنا جيري وأبما يسيطعون كلاهما فلاسفة في الهندسه اشتهروا كلاهما بتطوير الكوات والتي من المفترض أن تنقذ الأرض من مشاكل الزيادة السكانية.	My parents both engineers with doctoral degrees. Were known for their work in developing the balls. They supposed to solve Earth's overpopulation problems.
AI-based Translation	**Original Text (Translation)**	**Translated text (Back Translation)**

(Experimental Groups)		
The text	There were microorganisms in the soil making the planet capable of supporting plant life, but we would be completely responsible for cultivating the land.	كما لاحظنا وجود كائنات دقيقة في التربة مما يجعل الكوكب قادرًا على دعم الحياة النباتية، لكننا سنكون مسؤولين بالكامل عن زراعة الأرض.
Students' Responses	كان هناك كائنات حية دقيقة في التربة تجعل الكوكب قادرًا على دعم النباتات، ولكن سنكون مسؤولين تمامًا عن زراعة الأرض.	We noticed microscopic organisms in the soil, making the planet capable of sustaining plant life, but we would be entirely responsible for cultivating the land.

Table 6 demonstrates examples of students' translations in two different translation flows: English into Arabic and Arabic into English. The translation and back translation made by students using traditional methods reveal that their translations are slightly better than their back translations, though the difference is not statistically significant. The examples show that both students' translation and back translation still have problems in word choice, sentence structure, coherence and cohesion in both Arabic and English. On the other hand, students' translations using AI-driven translation tools show improved quality. However, the examples in the table show a slight significant difference in the translation quality of the two groups using AI tools, favouring the back translation group. This indicates that there is a small but statistically noticeable difference in performance. It seems possible that these results are due to the proficiency of AI tools in dealing with the linguistic features of each language. These tools may be more skilled at understanding the nuances of the English language, compared to Arabic. It can also be explained in the complexity of the two languages or the typical structure of the source materials. The present findings seem to be consistent with Mujiyanto (2016) in which google translate showed no difference between the translated version of a text from the source to the target language or the rendered version of the same text from the target to the source language.

Conclusions, implications, limitations, and suggestions for further research

The main goal of the current study was to determine the effect of AI-based translation tools on the translation and back translation of literary texts. It also aimed at identifying the change of the translation flow affected the quality of translation within groups using the same translation method. The finding of this study revealed that AI tools had a positive effect on both translation and back translation of literary texts done by Saudi

EFL learners. The study also concludes that while using AI translation tools, translating from Arabic to English shows a slightly better quality of translation than translating from English to Arabic. In contrast, the study proved no significant difference in translation quality between the subjects when using the traditional method regardless the translation direction.

Pedagogical implications:

The findings of this study have a number of important implications for further practice. The primary implication is that these valuable results can help understand the strengths and weaknesses of AI tools, thereby improving their performance and making them suitable for educational purposes. Another implication is that AI tools can be incorporated into the curricula of translation courses so that students can be familiar with these tools and their different uses in various translation situations.

The results of the study also enhance our understanding of back translation. Translation instructors can emphasize back translation activities among their students. These activities help students improve their overall translation skills and enhance their understanding of both source and target languages. Finally, the study extends our knowledge of the challenges students may encounter in translating literary texts. University professors might consider involving literary material in the curricula of translation to help students become acquainted with the distinct aspects involved in translating literary elements such as style, tone, settings, characters, and plot.

Limitations and suggestions for further research:

In this study, a number of important limitations need to be considered. Firstly, the study has only tackled the translation of literary texts. The results of the study may not be applicable to other types of texts, such as technical or legal texts. It is recommended that further research can be undertaken to the investigation of the effect of AI tools on other types of texts to achieve the generalizability of the results. Secondly, the focus of the study is limited to a specific AI tool, that is ChatGPT. Due to variations in algorithms across different tools, we might have different results with other AI translation systems. A further study could assess students' translations using different AI tools. Thirdly, the sample of the study was restricted to the students at a single university in one country. This limitation minimizes the generalizability of the findings. More research is needed to determine the effect of AI tools on students with different linguistic backgrounds and from different cultures.

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Competing Interests

The authors have no relevant financial or non-financial interests to disclose.

Consent

Informed consent was obtained from all individual participants included in the study.

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Appendix 1: The Translation Test

Task 1: Translate the following short story from English into Arabic.

Amsden, Christine. "Gateway." Tale of Innovation and Imagination, ESA Publication Division, 2003, pp. 31-34.

Task 2: Revert the previously translated short story back into its original language.