

Linguistic and Terminological Complexities in Post-Editing English-Arabic Machine Translations

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Abstract

The purpose of this research is to establish the challenges that professional translators face when translating using CAT and MT, particularly for the English-Arabic language pair. The research design used in the study is a comparative descriptive research design to compare different translations of source texts from English to Arabic using the SDL Trados CAT tool. The first research question is to define the most frequent types of errors in the translated texts produced by the participants of the study. The study seeks to establish some of the difficulties that translators encounter in relation to language and culture such as grammar, syntax, spelling, punctuation, style, formatting, accuracy, terminology and semantics. The research aimed to further raise awareness of these issues and how to address them in post-editing, which has been integrated into translators' education and training to enhance productivity and the quality of the end product. The study also seeks to offer suggestions to the researchers and developers of technology in the improvement of the MT systems especially for the Arabic to English translation. The results of the analysis show that the most severe problem was observed in the syntactic and grammatical aspects of the text when translating from English to Arabic. The findings can be of benefit to developers to enhance the translation tools for efficiency, especially for Arabic to English translation.

1. INTRODUCTION

Over the last few years, this notion of translation or interpreting has changed due to the translation technology that has boosted the overall productivity of translating large amounts of information and with the further requirement of speedy and efficient translations. Therefore, translators have to incorporate new technologies to meet the growing demand for translation services. As we can see technologies are not yet developed to fully replace human translators but they can help translators to work smarter. In the professional sphere, translators are expected to master the application of computer-aided translation tools (CAT) and machine

translation (MT) tools to satisfy clients' demands and deliver work on time (Mahdy, Samad & Mahdi, 2020.). The concept of post-editing (PE) is now considered an important part of the training of translators as well as in their practice to improve productivity and enhance the quality of the translated end product. Since MT is used in producing first drafts of translations, post-editing assumes a critical role in maintaining standards of translation.

The objective of this research is to highlight the linguistic and cultural challenges faced by translators; these challenges include linguistic elements such as completeness, precision, terminology, grammar, semantics, punctuation, spelling, syntax, style, and formatting. It also seeks to provide recommendations that may help in the editing process and provide feedback to researchers and developers of MT systems. The conclusions can be useful in improving translation technologies especially for the Arabic-English language pair to increase the quality of translation. Another objective is to increase the usefulness of computer tools for translators. This research highlights some key attributes that such tools should possess. These include methods to align the original text with the translation, search for similar phrases from previous work, and provide suggestions to translators as they work. In other words, this work attempts to ease the burden on translators and contribute to the development of improved translation tools. It does this by focusing on the details of the translators' practice and the tasks they must perform in order to be effective.

The research is committed to addressing these questions in order to achieve this objective.

- **Q1:** What kinds of errors are found in English-Arabic translations before and after post-editing (PE)?
- **Q2:** Where do most of these errors come from? Are they more common before or after post-editing?
- **Q3:** How many of these errors can be fixed by using PE guidelines? What methods can be used to effectively address both major and minor errors by applying PE principles?

Furthermore, the study aims to improve our understanding of the challenges translators face with English-Arabic translations and offer guidance to enhance the quality of translated materials.

2. LITERATURE REVIEW

2.1. Post-editing

The use of technology and computers has over the years become a norm in the translation process among translators. In the case of the translation industry, the use of technology has been steadily rising since the introduction of word processing software.

Translation memories (TMs) emerged as new technology assistance to translators in the 1990s (O'Hagan, 2020). In the 2000s, online dictionaries and encyclopaedias were introduced, which assisted translators even further. Today, MT is relatively popular among professional translators due to the advances in the field in the last few years. However, in the present age, the employment of computers and technology has become vital in the process of translation (O'Hagan, 2020).

The practice of post-editing, where the translator has to edit and correct the text translated by a machine, has become an established practice in the translation industry. The findings of several research indicate that post-editing outperforms human translation in terms of productivity while maintaining quality, according to Mitchell Schuitevoerder (2020), Poibeau (2017), Chan (2015), Sin-wai (2016), and Bielsa (2021).

Hence, post-editing is the process of reviewing and enhancing some text that has been translated by a computer from one language to another. This is different from revision where the aim is to edit the drafts prepared by human translators for mistakes.

“Post-editing can be considered the correction and perfection of content already automatically translated (in contrast to the task of ‘revision’, which although similar in some aspects, deals with the error correction of human-produced draft translations). It is the task of the post editor to edit, modify, and/or correct pre-translated text that has been processed by a machine translation system from a source language into (a) target language(s).” (Allen, 2003).

Allen also stresses the fact that post-editing is a linguistic and cultural activity. To understand its complexity, it is necessary to consider different classifications based on the degree of editing: full post-editing, human quality, and rapid or light post-editing, with a low degree of correction of the text.

Moreover, the classifications of post-editing could be established according to the levels of corrections and effort required by the editor, as suggested by Almeida (Almeida, 2009).

Full post-editing: check that the target text is of high quality by correcting grammar, fluency, terminology, style and voice. To attain a quality that is as good as or comparable to that of human translation, more human input is needed.

Light post-editing: means that the post-editor does not have to perform many changes on the raw material provided by the MT system in order to get a fully readable and functional target text although it is not necessarily linguistically, stylistically, or culturally flawless. The post-editing activities can be classified according to the customer requirements, time and quality factors, time to complete the post-editing, and the usage of the final text (Carl et al., 2015).

2.2. Post-editing environments

Tools referred to as computer-aided translation (CAT) or translation environment tools (TEntTs) are applications that are intended to enhance the efficiency and quality of the work done by post-editors and translators. They are intended to decrease the total costs of translation activities but at the same time to keep the income of translators and guarantee a reasonable level of quality (Nitzke, 2019). In other words, CAT tool systems isolate a text into 'translational segments,' which are usually sentences that are separated by punctuation marks, and look for bilingual Translation Memories to seek for exact or approximate matches based on the source and translation segments. Also, they often seek and find specialized terms in the appropriate Bilingual Term Bases (Aziz, s. d.).

CAT systems were developed beginning in the early nineties to meet the rising need of organizations and institutions to target products and services towards other languages and markets (localization) (Screen, 2019). Moreover, CAT tools systems are intended to augment and help translators and translation companies to enhance productivity and maintain dependability even if several parties are incorporated into working under the same brand (Carl et al., 2015). Finally, they reduce significantly the incidence of errors through; Integrated QA features, among others (Aziz, s. d.).

2.3. Quality: Human translation and post-editing

There are a number of papers that have investigated the quality of full human translation (translation from scratch) in relation to post-editing machine-translation output. Such studies, in non-literary and literary translation contexts, have demonstrated that post-editing of high-quality machine translation can undoubtedly improve the productivity rate of professional translators as compared to human translation from scratch. Various studies by O'Brien, Groves, Schmidtke, Tatsumi, Guerberof, Plitt, Masselot, Genzel, Greene, Jones, Irvine, Besacier, Toral, Way, Moorkens and other scholars have been conducted to assess the productivity increase from post-editing machine output and the amount of cognitive load that post-editors have to bear.

However, other scholars argue that since there are inherent constraints to the use of machine translation, the technology will never be able to produce work of the quality of a professional translator. Other scholars such as Melby and T. Warner are in full support of this view (Ahrenberg, 2017). Currently, MT can only reach the quality of a native speaker in certain scientific and literary fields and is gradually becoming a part of CAT tools. In conclusion, scholars argue that although machine translation with post-editing is a great threat, it is also a great opportunity to improve the quality and effectiveness of the translation process.

2.4. Post-editing practice: a focus on the Arab world

The Arabic language is different in terms of structure from the English language. Therefore, the MT between Arabic and English may not be as good as that between English and other languages of the Indo-European group. Since the early days of MT, the language systems have been striving to close the gap between them by constantly improving the translation platforms and software. Despite this, certain issues in Arabic phrase structure are observed in the outputs of these programs, particularly at the word and phrase level in Arabic translations (Sismat, 2016).

The application of translation technologies in the Arab world's translation market is not examined in detail. There might be a lack of link between these technologies and the professional field, and this might be attributed to the scarcity of professional translators in this area (Al-Samawi, 2014). Almutawa and Izwaini conducted a study on the use of MT and PE in the Arab world where they focused on the practice of post-editing and the expectations of MT in a professional context in Saudi Arabia (Almutawa & Izwaini, 2015). The study also points out that MT is intended to assist translators not to compete with them; therefore, translators should apply MT to enhance the quality and speed of translated texts. This also notes that there is not much research done on MT exploration in the Arab world and more efforts are needed to improve the current Arabic MT systems (Almutawa & Izwaini, 2015).

2.5. Materials and Methods

This study aimed to identify the errors that twenty-five MA students made when translating particular passages from the book *Handbook of Translation Studies* by Yves Gambier and Luc van Doorslaer. The study focused on assessing the impact of MT after the first round of post-editing by human translators. The translations were provided by the students as part of their practical assignment for the S1 course on Terminology.

The participants of this study were twenty-five MA students who were studying in the Master's program of Translation Technology and Specialized Translation. The main procedure

employed to assess the errors committed by the participants was full post-editing. In the course of the study, post-editing guidelines were applied using SDL Trados (2021) software since the software offered numerous features that were relevant to the research process. The collected data were then analysed through the processes of description, comparison and interpretation. To sum up, the purpose of the study was to identify the post-editing errors and to explore the possibilities to improve the effectiveness of MT in the translation market.

The approach used in this study was error analysis, which focused on the mistakes that are made when post-editing machine-translated texts. To improve the quality of the machine translation output and to increase the post-editors awareness of recurrent mistakes, the errors were categorized based on several criteria. When the post-editor is fully informed of the errors that occur during the process of editing, it will be possible to identify them and correct them. Thus, the classification of mistakes was intended to enhance the effectiveness and productivity of post-editing.

2.6. Correction checklist

LSP texts have their own specific PE guidelines, therefore, the approach applied is complete post-editing which serves as the primary method to identify the mistakes made by the participants of the study. According to Ke Hu and Patrick Cadwell, the quality of full PE guidelines should have no difference from human translation (Hu & Cadwell, 2016). According to Ke Hu and Patrick Cadwell, the quality of full PE guidelines should have no difference from human translation (Hu & Cadwell, 2016):

“The requirements of the full PE guidelines surpass the considerations of the light PE guidelines in terms of accuracy, semantics, and culture in particular. Different from light PE guidelines, most full PE guidelines require the correctness of terminology, grammar, punctuation, syntax, and formatting”.

The PE guidelines that are going to be used in this study are inspired by TAUS in TAUS Post-Editing Guidelines: (Massardo et al., s. d.)

Full PE guidelines	TAUS (2016)
Accuracy	TT communicates the same meaning as ST
Terminology	Consistent and appropriate
Grammar	Correct
Semantics	Correct
Punctuation	Correct

Spelling	Apply basic rules
Syntax	Make modifications following practices for the TL.
Style	Consistent, appropriate and fluent
Restructure	Rewrite confusing sentences
Culture	Adapt all cultural references.
Information	Fully delivered
Format	Correct (including tagging)

3. PRESENTATION AND DISCUSSION OF RESULTS

In the context of the current research, Results and Analysis are deemed to be the most important sections. It is an analytical, descriptive, and interpretative continuation of the previous chapters. In terms of language, eight areas were identified and discussed in an investigative approach; namely Completeness, Accuracy, Terminology, Grammar, Semantics, Syntax, Style, and Formatting.

3.1.Types of errors

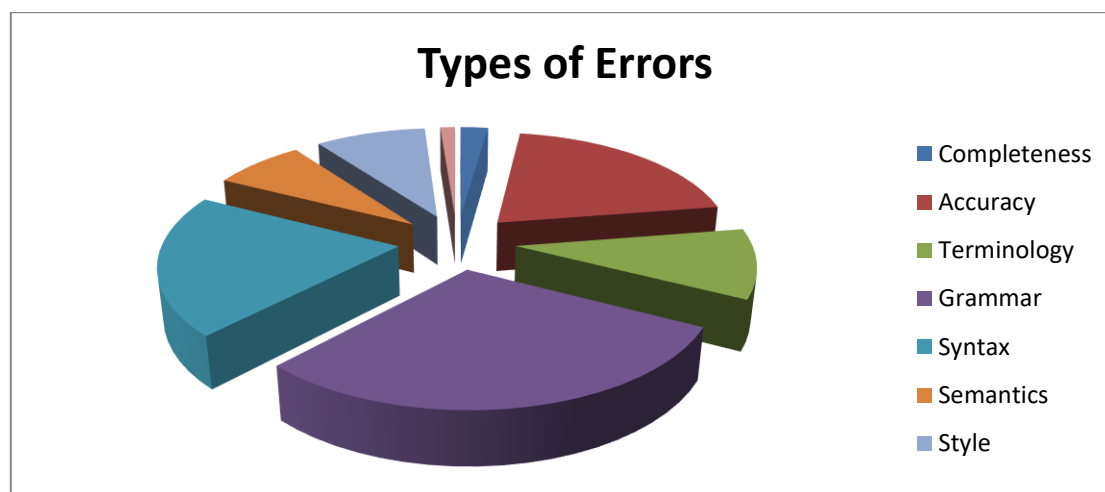


Figure 1: Types of errors

The study focused on the qualitative analysis of data collected from the participants who were engaged in English-to-Arabic translation tasks. It analyzed the mistakes made in the linguistic and content analysis of the translations and provided insights into the difficulties that translators and post-editors encounter. The most common type of error was grammatical, which made up 30% of all the errors observed. The second most common type of error was the syntactic errors which accounted for 20% of the total errors. Accuracy errors, terminological errors and stylistic errors accounted for 20%, 10% and 9% of the errors respectively. The terminological errors were also found to be quite frequent, contributing to 10% of the total errors. Even though there were fewer of them, the stylistic mistakes still comprised a significant 9% of the mistakes.

The errors were then categorized into subgroups based on the possible causes of the mistakes that were made. Rule-based errors which are due to the wrong use of grammatical and syntactic rules accounted for the largest percentage of errors, 44%. The second type of mistake, which is connected with terminology and conceptual problems, was identified as knowledge-based mistakes and accounted for 47% of all the mistakes. However, the errors that were skill-based were less severe and comprised only 9% of the total errors made.

Among all the observed linguistic mistakes, it was ascertained that grammatical mistakes were the most prevalent, thus a major concern. These were wrong verb tenses, wrong word order and wrong use of inflections. Also, syntactic mistakes, which referred to the issues of cohesiveness and coherency, were identified. The participants reported difficulties in terms of accuracy which included translation errors and semantic inaccuracy, which highlighted the importance of relaying the message in the target language. Some terminological errors including variation in the choice of terms and inconsistency were noticed because of the problem of translating specialized terms or ideas. Some of the problems that were noticed include: There was a lot of repetition, the sentences were wordy and unclear and this made the translated texts to be less fluent.

The findings highlighted the challenges of the translation tasks which pointed to the fact that one should not take a casual approach to details and language proficiency. Translators were able to show satisfactory results in dealing with language-related errors, however, content-related errors were quite frequent, which proved the necessity of post-editing to ensure the quality of texts translated by machines. Furthermore, the study grouped errors into skill-based, rule-based and knowledge-based levels which helped the researcher gain an insight into the possible causes of translation errors. Among the observed errors a large number of them were rule-based errors which stemmed from the incorrect application of grammar rules and syntactic structures.

Table 1: Analysis of Errors in Translation: Types, Examples, and Post-Editing Corrections

Types of errors	Specific types of errors/mistakes	The source text	The target text	Post edited rendering
Accuracy error	Wrong Collocation	“to cite a few examples.”	كما هو الأمر على سبيل المثال لا الحصر.	كما هو الأمر على سبيل الذكر لا الحصر.
Accuracy error	Wrong terminological choice	“In English-language scholarship, from media and	في أدبيات اللغة الإنجليزية من خلال الدراسات الإعلامية ودراسات الاتصال.	في أدبيات اللغة الإنجليزية من خلال الدراسات الإعلامية و الدراسات التواصلية.

		communication studies.”		
Terminological consistency	Strange Terminological choice	“Nida distinguishes between formal and dynamic equivalence in translation, “formal equivalence” referring to a faithful reproduction”.	يميز نايدا بين التكافؤ الرسمي والديناميكي في الترجمة إذ يستعمل "التكافؤ الرسمي" في إشارة إلى إعادة إنتاج غير محرفة	يميز نايدا بين التكافؤ الصوري والديناميكي في الترجمة إذ يستعمل "التكافؤ الصوري" في إشارة إلى إعادة إنتاج غير محرفة.
Terminological consistency	Incorrect term	“Into Quebecois and Scots as indicated above.”	الترجمات إلى الكيبكويز والاسكتلندية كما هو موضح أعلاه.	الترجمات إلى لغة سكان كيبك والاسكتلندية كما هو موضح أعلاه.
Syntactic error	Word order	“Egyptian plays have been considered unstageable.”	أن المسرحيات المصرية اعتبرت غير قابلة للترتيب.	اعتبرت المسرحيات المصرية غير قابلة للتنفيذ المسرحي.
Syntactic error	Wrong conjunction	“Understanding the robust site of these practices entails comprehending the Web.”	وإن فهم الموقع القوي لهذه الممارسات يستلزم فهم الويب.	كما أن فهم الموقع القوي لهذه الممارسات يستلزم فهم الشبكة العنكبوتية.
Stylistic error	Redundancy	“the playwright has been seen to put in the text the meanings.”	شاهد الكاتب المسرحي وهو يضع في النص.	يأخذ الكاتب المسرحي على أنه أساس وضع معاني النص.
Semantic errors	Word-for-word translation	“in order to be able to comply with the provisions and specifications settled on with their clients”	من أجل أن يتمكنوا من الامتثال للأحكام والمواصفات التي تم الاتفاق عليها مع عملائهم.	من أجل أن يتمكنوا من الامتثال للأحكام والحيثيات التي تم الاتفاق عليها مع عملائهم.
Semantic errors	Distortion of meaning	“by the Brazilian scholar and literary translator Mauricio Mendonca Cardozo.”	من طرف الباحث و المترجم الحرفي البرازيلي مورييسو كاردوزو.	من طرف الباحث و المترجم الأدبي؛ البرازيلي مورييسو كاردوزو.

For the purpose of providing high-quality translations, it is essential to identify various kinds of mistakes that can be committed during translation. The mistakes described in the examples are quite typical and can influence the quality, the coherence and the correctness of the translation.

3.2.Semantic errors

Semantic errors are those in which the translator does not convey the meaning of the source text as it is to the target language. For instance, in the first example, the word “unstageable” has been translated as “غير قابلة للترتيب” which results in a loss of meaning, as the Arabic translation does not capture the nuanced connotation of the English term. Similarly, the translation of the term “formal equivalence” as “التكافؤ الرسمي” in the second example is

semantically unsuitable because the chosen terminology does not correspond to the intended meaning in the given context.

3.3. Accuracy errors

Accuracy errors are related to the use of wrong words or a violation of the set idioms (collocations) of the target language. The mistake such as “الذكر لا الحصر” instead of the correct collocation “على سبيل الذكر لا الحصر” is an example of an accuracy error because collocations are set phrases that should not be changed in translation. Also, the fluctuation in translating a term like ‘Quebecois’ within the same text can lead to accuracy errors and disrupt the cohesiveness of the target text.

3.4. Terminological consistency

Maintaining terminological consistency is crucial for ensuring clarity and cohesion in translations, especially when dealing with specialized domains or technical texts. The examples highlight inconsistencies in translating terms like "web" (alternating between "الشبكة المعلوماتية" and "الويب") and "literary" (translated as "الحرفي" instead of the standard Arabic equivalent). Such inconsistencies can confuse the reader and should be avoided.

3.5. Stylistic errors

Stylistic errors are those that are associated with the style and the fluency of the translated text. The example “شوه الكاتب المسرحي وهو يضع في النص” is an example of redundancy which is a stylistic mistake. These kinds of repetitions should be avoided to improve the clarity and fluency of the translation. Also, literal translations that do not take into consideration the differences in language and culture can be considered stylistic mistakes, as in the following translation: “From the side of the researcher and the Brazilian literary translator, Morizio Cardozo”.

3.6. Source of errors

According to Rasmussen, the sources of errors whether in PE of MT or translation from scratch are based on the so-called; skill-rule-knowledge framework, thus, differentiating between three sources of errors: The taxonomy of errors that Reason (1990) proposed includes errors of skill-based, rule-based, and knowledge-based types. First of all, the skill-based level, which describes errors that are committed in multiple translational segments by accident; for example: a typee (typographical errors). In addition, the rule-based level explains the improper use of grammar rules (Syntax and Grammar). Lastly, the knowledge-based level is the state of the translator when he/she has no specific strategy to deal with that particular situation; for instance, when the translator selects the wrong context in the term or decides to go for a too-direct translation (Reason, 1990). Based on the aforementioned categorization in addition to

the results and analysis section, the following categorization is applied to the results obtained from the study. Based on the aforementioned categorization in addition to the results and analysis section, the following categorization is applied to the results obtained from the study.

Table 2: Translation Errors Across Different Levels

Categorization	Number of Errors	Proportion
Skill-based level	53	9%
Rule-based level	258	44%
Knowledge-based level	271	47%
Total	582	100%

The table describes how translation errors are distributed across three levels of expertise: These are the skill-based, rule-based and knowledge-based systems. At the skill-based level, errors are random and can happen at any point in the translation of several segments due to carelessness such as typing mistakes. Of the total errors identified in this study, 9% were of this nature, which means that the students were either careless or lacked mastery of the English language. The rule-based level is responsible for mistakes that stem from the improper use of grammar rules, syntax, or other language rules. This level contains 258 errors, which is 44% of the total number of errors and, therefore, is a considerable portion of the translation difficulties. Rule-based errors are characterized by improper use of terms, and wrong word formation, for example. Knowledge-based errors occur when translators are faced with situations that cannot be solved by applying a set of rules. Such mistakes may include selecting the wrong term within a given context or going for direct translations. Out of all the errors, 47% are knowledge-based errors with a total of 271 errors in this study. Misunderstandings and semantic shifts are the main sources of mistakes at this level, which are connected with terminology.

In general, the distribution supports the idea of the relevance of both the rule-governed and the knowledge-based strategies in translation. Rule-based errors suggest that there is a lack of understanding of grammatical and syntactic rules while knowledge-based errors point to the lack of understanding of terms and conditions. Correcting such kinds of mistakes entails the improvement of the translator's language skills and the acquisition of more in-depth knowledge of the subject matter to produce accurate translations.

4. DISCUSSION

Sismat used post-editing guidelines in his dissertation research to determine their impact on the quality and productivity of translation. The study involved human translation

with post-editing of MT outputs by Malay students learning Arabic and English. According to the data, post-edited MT outputs had a higher number of syntactic and lexical errors as compared to content errors (Sismat, 2016). The research also found out that some grammatical and syntactical mistakes seemed to be affected by the language transfer. These concerned errors of gender, order, articles, and number. These results underscore the importance of translators' understanding of differences between languages to produce accurate translations.

To identify the degree of influence of different mistake types on the quality and efficiency of translation, Condon et al. carried out a preliminary study (Condon, Parvaz, Aberdeen, Doran, Freeman, & Awad, 2008). The study mainly focused on errors resulting from structural and grammatical differences between Iraqi Arabic and English. The study identified certain kinds of errors that can be expected because of these differences, such as syntactic and stylistic errors. As in the case of Sismat, this underlines the significance of the analysis of the shades of meaning in both the source and target languages to provide accurate and precise translations.

The findings of this research are in concordance with the studies conducted by Sismat and Condon et al., which show that the biggest problem in English-Arabic translation is the presence of grammatical mistakes. Participants likely struggled with two main issues: linguistics and the choice of content-related terms. These stress on the acquisition of language skills, cultural sensitivity, content knowledge, and the target language. It is important to review MT outputs very carefully because post-editors may not notice or may choose to disregard certain linguistic and content mistakes.

5. CONCLUSION

The aim of this study was to establish the types of errors made by translators (post-editors) and most importantly, the solutions that can be provided as guidelines for post-editing process which can be used as feedback by researchers and developers of MT systems. The results of this study support the study done by Sismat (2016) and Condon et al (2008). Altogether, these results indicate that grammatical errors were the most critical in English / Arabic translations. We surmise that most participants have issues on two main levels: linguistic and content related; as they have not been able to either provide with the right terminological choices or else they have been hampered by purely linguistic problems. These results confirm the necessity of developing the linguistic and intercultural competencies and further developing the expertise in the domain area and the target language, as such mistakes,

although can be easily identified and eliminated, can also be easily overlooked if the post-editors are not attentive and do not pay enough attention to the MT outputs.

The current study has some limitations and implications for future research. Firstly, it is limited to the English-to-Arabic language pair only and hence the findings cannot be generalized to other language pairs. Also, the study was done with a small population of twenty-five participants, who were not native speakers of standard Arabic and English. Therefore, future research with a large sample size would yield more meaningful and accurate outcomes but at the same time, it would be time-consuming and demanding. A limitation of the study is that the study only used SDL Trados as the CAT tool and thus, other CAT tools may produce different results. Last but not least, the study was based on error analysis and observation of error patterns only and other features of translation technology in general and PE in particular are still untouched. These limitations indicate that more research should be conducted on other language pairs, more participants, other CAT tools, and other aspects of translation technology and PE.

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