POST-EDITING OF MACHINE TRANSLATION OF AN ENGLISH-INTO-ARABIC TEXT BY TRANSLATION STUDENTS

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ABSTRACT

Post-editing is a necessary process for the amendment of machine translated texts to produce an acceptable output. This study aims to enhance the competency of translation students in post-editing a machine-translated text and the efficiency of the end product in conveying the desired message to the reader. To fulfill this aim, an experiment was carried out to examine the ability of twelve 4th year translation students in the Departments of Translation at AL-Mustansiriyyah and Mosul universities to post-edit an English journalistic text into Arabic via google translate. The study followed a mixed-method research design. Quantitative data were analyzed within the Dynamic Quality Framework adapted by the Translation Automation User Society. The students' post-editing performance was evaluated in terms of how many error types were made, as well as the effect of errors on the quality of the text. The analysis showed that the most common error types were: 62.5% accuracy, 15.2%fluency, 8.3%terminology, and 45.8%verity of language. The end quality level among students was 62% major, 23.6% minor, and 13.8% kudos. It was also found that the translation students generally made the same errors, probably because of their language competency level and their lack of post-editing skills.

KEYWORDS: Machine translation, Post-editing, Translation Students, the Translation Automation User Society, the Dynamic Quality Framework.

1.INTRODUCTION

The rapid development of machine translation (MT) and post-editing (PE) has led translators to use MT more than conventional human translation (HT). PE of MT has become an essential part of the translation industry. In the educational setting, translation students tend to use Google translate (GT) to perform their translation assignments. The quality of the end product is questionable based on their teachers' observations. On the bases of these observations, the study poses the following questions:

1. What type of errors are made by translation students when they post-edit an MT text?

2. What is the effect of errors on the quality of the post-edited text?

To meet the increasing demand for PE, translation students should be evaluated as probable post-editor candidates. Therefore, the present study investigates the students' competency of MTPE in terms of translation accuracy, fluency, terminology, style, and verity of translation end output, according to the Translation Automation User Society (TAUS) Error Typology Benchmark Dynamic Quality Evaluation (DQF) (2021).

2. THE ORETICAL BACKGROUND AND LITERATURE REVIEW

2.1 Machine Translation

MT is an automatic translation system that processes a source text (ST) in one language and creates a target text (TT) in another. MT systems have existed since the middle of the twentieth century. They help people translate one language into another language mechanically without human interference.

Hutchins (2000) stated that MT is a solution that will soon be able to handle all types of texts and offer a quality comparable to that of HT. It is crucial to note that although MT has become increasingly accurate, there is still no MT engine that can create translations that are superior to (and can be used in place of) those produced by human translators.

Unfortunately, the translation made by MT is not final. A text that uses MT is merely an "output" or a collection of "suggestions" or "hypotheses" for its translation. The final translation is the responsibility of the post-editor or the translator (Koponen, 2021, p. 40). MT processes are what Catford called "transference rather than translation" (1965, p. 43), which

means that the output is purely determined by the meaning of the source language (SL), without consideration for how an idea should be conveyed in the target language (TL).

There are many reliable translation tools available today, including Microsoft, DeepL, and GT. GT is one of the most popular MT websites that translates written texts from one language into another because it "has shown the best accuracy among other machines" (Putri & Havid, 2015, p. 183). Since its start on April 28, 2006, it has always been free to use. Anggrina et al. (2017) stated that GT is a famous MT used by many people worldwide. With GT, you input the text, select the SL and TL, then GT produces the translation. However, the texts that GT translates still require a human translator to post-edit them. The translators who embrace PE often report that their day-to-day work becomes much more interesting.

2.2 Post-editing

The task of PE can be categorized differently based on the volume of corrections and the effort required. For example, Laurian (1984) defined PE as a way of thinking about a text and working on it for a new purpose rather than rewriting, revising, or correcting it.

Allen (2003, p. 297) defined PE as the process of "revising and/or fixing translated material that has been processed and produced by a machine translation system." She also stated that it is "a term used for the correction of machine translation output by human linguists/editors." The process of humans amending machine-generated translation to produce an acceptable final output is known as PE. O'Brien (2005, p.40) added that PE is "the activity of fixing errors in MT output so that the target text meets an expected level of quality."

Generally speaking, there are two types of post-editing: the most common levels are frequently referred to as "light" and "full" PE. In light PE, the attention is on ensuring that the TT correctly reproduces the meaning of the ST, so spelling or grammatical errors are of secondary importance. The most crucial factor is if the translation gives the reader sufficient information, while in full PE, the post-editor creates a translation on the level of HT in terms of quality (Massardo et al., 2016). TAUS mentions these levels based on two standards of expected TT quality, namely "good enough" quality and quality which is "similar or equal to human translation."

While an early report on PE practices at the European Commission refers to a "rapid" and "full" level of PE, the critical distinctions between the two are the amount of time spent on the assignment and the quality of the result (Wagner 1985). In addition, Allen (2003) adds another level after Wagner's classification, "Minimal" PE, which has also been mentioned as an ambiguous level between 'rapid' and 'full.' Finally, another study by Van Egdom and Pluymaekers (2019) stated that there are four levels of PE: "minimal," "light," "moderate,", and "full."

2.3 Previous Studies

In their study "A comparative study of human translation and machine translation with post-editing," Lee and Liao (2011) worked on two groups of college students with different English proficiency levels. The first group received only the ST. In contrast, the second group received the ST in addition to a machine-translated text for PE, aiming to examine the similarities, differences, and procedures between these two translation methods. When asked to come up with a list of potential users and scenarios where MT could be beneficial, several students suggested that freelance translators could benefit from MT by having the ability to create more translations in less time and so earn more money. In addition, they concluded that the MT text helped minimize errors in some student translations. Additionally, the usage of MT narrowed the gap between students with varying degrees of language proficiency. The qualitative research revealed how to use the MT text and the differences in lexical choice and other features between the two student groups. However, this cannot be seen as adequate because HT can be seen as a creation whereas PE, is as a correction mechanism.

Yamada (2015) examined students' proficiency in PE by analyzing student attitudes toward PE work, the final quality of student post-edited products, and students' relative qualifications as post-editors. Participants were requested to submit reports after the experiment whether they thought the PE task was more straightforward than conventional HT (by answering yes or no). Later, they were asked to assign a number to their perceived PE effort as a proportion of their perceived level of ordinary HT effort. The findings showed that over 74 % of students thought PE was simpler than HT, while only 26% did not. He also determined the quality of the student's final post-edited product, implying that the errors that students made

depend more on the types of errors that the segment has rather than the type of post-editors they are. This finding suggests that PE and HT require different talents while overlap exists. In addition, the results of this experiment indicated that practical PE courses should explicitly instruct students in beneficial ways to PE. However, his study was exploratory, and the findings are consequently limited to one language pair and direction, one domain, and one MT system (GT). The students who did not experience any reduction in effort due to PE are likelier to be poor post-editors. Moreover, working on an extended text (486 words) during a PE exercise may affect their performance.

Koponen and Salami (2017) investigated the quality of PE in a light PE task in terms of correctness and the necessity of corrections. The validity and need for the changes were examined based on an investigation of an English-Finnish MT text post-edited by translation students. Correctness is assessed regarding the TL grammaticality and semantic correctness. Necessity was distinctly based on whether the edits were crucial to correct the meaning or language, or whether they seemed to be special edits related to style or word choices. Their findings demonstrated that while most of the corrections made throughout the work were accurate, a sizable portion (34%) was unnecessary. Furthermore, the results suggested that particular types of editing, such as word-order changes and deletions of personal pronouns, are commonly unnecessary for this language pair. This finding may have consequences for PE training and practice.

Shakir (2021) investigated how post-edited GT output can increase the quality of translation students' work. Her research examined the quality of the final products produced by 44 final-year translation students at the University of Basrah, emphasizing the amount of PE connected to the types of errors generated by GT. In addition, her study investigated the abilities of students' to post-edit a scientific text translated by GT. The study demonstrated that translation students might provide post-edited GT output of a "good enough" quality (according to TAUS, 2016) without specific instruction or training. However, according to the data analysis, only (68.1%) of translation students were interested in PE. The error types made by students were (48.8%) grammatical errors and (21.2%) terminology errors that still need to be corrected.

Zhang and Torres (2022) examined the effectiveness of MTPE training for foreign language students. Participants were divided into two groups: eight in the control group (who did not receive training) and eight in the experimental group (who underwent MTPE instruction). Most participants in the first group could not recognize or fix the MT errors related to the correctness, word order, official name, preposition, omission, and formal style. The second group spent less time and paused less, and their editing was more successful. They also modified more than was necessary, including accurate terms. The study demonstrated that training for specific MT mistakes and considering different difficulty levels might be a suitable approach to PE training. They found that students who were trained in particular error types could gain practice and experience in spotting and solving errors. The results showed that the PE of MT into L2 turned out to be a complex task, but students can develop their PE skills with proper training. The study concluded that it is not recommended to introduce students to MT without prior MTPE training and that it may be more beneficial to concentrate on some particular error types.

3. METHODOLOGY

3.1 Research Design

The present study follows the mixed-method research design. The data were collected and analyzed both qualitatively and quantitatively. This data integration enabled the research to view the process of PE from different viewpoints.

3.2 Participants

Twelve 4th year students (the academic year 2021-2022) from two universities participated in this study, Mosul University, and AL-Mustansiriyyah University. All the students were from the Department of Translation, College of Arts, with no professional experience or formal training in PE. Six of them were from Mosul university, and six were from AL-Mustansiriyyah University. The selected students were all native Arabic speakers. They all participated in this test voluntarily.

3.3 Material

The material was a journalistic English text downloaded from Fox magazine. The text length was 146 words. The following figure shows how the text runs sentence by sentence with its corresponding MT and suggested post-edited sentences correctly for the purpose of analysis and discussion. (See Appendix B)

ST	Mayoral candidate Yang backs NYC casino despite 'many downsides'
MT	مرشح العمدة يانغ يدعم كازينو مدينة نيويورك على الرغم من "العديد من الجوانب السلبية".
ST	New York City mayoral candidate Andrew Yang said Wednesday that the city could benefit financially from the development of a casino despite the "many downsides" of the business.
MT	قال أندرو يانغ ، المرشح لمنصب عمدة مدينة نيويورك ، يوم الأربعاء أن المدينة يمكن أن تستفيد مالياً من تطوير الكازينو على الرغم من "الجوانب السلبية العديدة" للأعمال
ST	As the city faces a $15 billion deficit after nearly a year of COVID-19, developers are looking toward the possibility of opening a casino that could generate hundreds of thousands of dollars in revenue, according to The New York Times.
MT	نظرا لان المدينة تواجه عجزا قدره 15 مليار دولار بعدما يقرب من عام من,19 – Covid يتطلع المطورون نحو امكانية فتح كازينو يمكن ان يدر عائدات بمئات الالاف من الدولارات ، وفقا لصحيفة نيويورك تايمز .
ST	"We need big ideas," Yang tweeted. "There are many downsides of casinos but the upside is $700m+ recurring annually largely from tourists now going to CT and NJ.
MT	وكتب يانغ على تويتر: "نحتاج إلى أفكار عظيمة". "هناك العديد من الجوانب السلبية للكازينوهات ، لكن الاتجاه الصعودي هو 700 مليون دولار + يتكرر سنويًا إلى حد كبير من السائحين الذين يذهبون الآن إلىNJ , CT .
ST	That's money for teachers, hospitals, and other services, we should be trying to grow revenue where possible.
MT	هذه اموال للمدرسين والمستشفيات والخدمات الأخرى، يجب ان نحاول زيادة الأيرادات حيثما أمكن ذلك."
ST	" He added that he would rather "NY and NYC get that gaming revenue and activity rather than see it all go to neighboring states."
MT	واضاف انه يفضل ان "تحصل نيويورك ونيويورك على عائدات ونشاط الالعاب بدلا من رؤيتها تذهب جميعها الى الدول المجاورة".

Fig. (1): The English Journalistic Text and Its Raw MT.

3.4 Data Collection and Procedures

The data collection was carried out in April 2022. Four texts were selected, and translated by GT and distributed to the students to post edit during lecture time which is 45 minutes. The texts were prepared in a word file format, where the ST and raw MT output were laid in the same paper. The students post-edited the raw MT output by overwriting it. The students were not allowed to use any dictionaries or any other sources for the process of PE. The quality of students' PE was judged in terms of TAUS DQF Error Typology Benchmark (TAUS, 2021).

3.5 Tools for Analysis and Evaluation

Students' final outputs were evaluated using the TAUS error typology as a model, Error Typology Benchmark: TAUS Dynamic Quality Evaluation. (2021). The evaluation was conducted according to the categorization of the errors. This evaluation was checked by a professional teacher of the Arabic language as well as the researcher's supervisor. However, only some criteria were employed because some were not pertinent to our study. Firstly, the criteria used will be defined (see Appendix A). Secondly, reasons for the exclusion and modification of the criteria will be mentioned.

3.5.1 Error Typology

a. The criteria used are:

1. Accuracy: addition, omission, untranslated (material), over-translation, under- translation, mistranslation.

1. Fluency: punctuation, spelling, grammar, grammar register, inconsistency.

2. Terminology: inconsistent use of terminology, untranslated terminology.

3. Style: awkward, inconsistent style, unidiomatic.

4. Verity: culture-specific reference.

It is worth noting that sometimes the student does not post-edit but simply reproduces the MT error, e.g., reproduces the MT mistranslation, omission, or verity. In these cases, the absence of PE is assigned to the type of error reproduced.

b. The excluded criteria are:

Having applied the original criteria to the data of the study, some were excluded and/or modified for the following reasons:

1. Under accuracy, one granular error type was excluded, viz., improper exact translation memory(TM) match. Students did not have access to a TM system.

2. Under fluency, three granular error types were excluded, viz., inconsistency, link/cross reference, and character encoding. The first one was excluded because, generally speaking, abbreviations are not used in Arabic. The second one was also excluded, because this type of error is pertinent to online PE. As for the third one, it was irrelevant, because the students' PE process was handwritten.

3. Under terminology, one granular error type was excluded, viz., inconsistent with term base, and one granular error type was added, viz., untranslated terminology. The reason behind excluding the first category was that there was no specified term base for students to follow in their PE. Regarding the added category, the students either translated the terminology or left it untranslated. So another granular error type was added to the criteria because it applies to the students' output.

4. Under style, two granular error types were excluded, viz., company style and third/party style, because students were not supposed to follow any specific style.

5. Under design, all granular error types were excluded, they included: length, local formatting, markup, missing text, and truncation text expansion. These categories were excluded because the PE task was handwritten.

6. Under the locale convention, all granular error types were excluded, rendering this error type inapplicable and therefore excluded. The granular error types are: address format, date format, currency format, measurement format, shortcut key, and telephone format. This type of error happens with texts where change of content is necessary as in website localization, Error Typology Benchmark: TAUS Dynamic Quality Evaluation. (2021).

3.5.2 Severity of Levels

There are five severity levels: Critical, Major, Minor, Neutral, and Kudos. These levels were amended in the description to apply to the reader and TL text rather than the company, application, product, and service .

1. Critical: Errors that may cause adverse implications or "negatively modify/ misrepresent the functionality of" the ST, "or which could be seen as offensive."

2. Major: "Errors that may confuse or mislead the… [reader] due to significant change in meaning or because errors appear in a visible or important part of the content."

3. Minor: "Errors that don't lead to loss of meaning and wouldn't confuse or mislead the… [reader] but would be noticed, would decrease stylistic quality, fluency or clarity, or would make the content less appealing."

4. Neutral: "Used to log additional information, problems or changes to be made that don´t count as errors, e.g. they reflect a reviewer's choice or preferred style..."

5. Kudos: "Used to praise for" correct PE, Error Typology Benchmark: TAUS Dynamic Quality Evaluation. (2021).

4. ANALYSIS AND DISCUSSION

According to TAUS error typology, there were five type**s** of errors in the selected text; accuracy, fluency, terminology, and verity. As said earlier, students' PE for the translated text was judged according to the mentioned errors. In addition, the evaluation of students' PE was based on using as much of the MT raw output as possible (Massardo et al., 2016). The selected text was segmented into six sentences to analyze and discuss the results. The study's data were put in an appendix for more clarification to check and see the students' end product. (See Appendix (B) tables1,2,3,4,5, and 6).

The title includes one semantic error, GT translated the phrase 'mayoral candidate' into 'مرشح العمدة'while it is be should best translated into 'رئيس البلدية' (See AL-Maany Dictionary). There is no need to delete any word, only one addition is required, which is the preposition'في' to make the translation clearer. Students number (2,8,9,10,11, and 12) did not do any PE, while the others produced the mistranslation 'مرشح العمدة', except student number (7) who corrected that into'المرشح لرئاسة البلدية'. (See Appendix (A), Table (1)).

In the first sentence after the title, the same error occurred with the phrase 'mayoral candidate', and the word 'business' was pluralized into 'الاعمال' which should better be kept singular 'هذا العمل' or 'للكازينوهات' according to the meaning of the whole text. Students (1,3,6, and12) did not post-edit, while the other students mistranslated 'mayoral candidate' into'مرشح العمدة' and pluralized 'business' into'الاعمال'. Only student number (7) did the correct PE as'للكازينوهات' and'رئاسة البلدية', or 'لهذا المشروع' as student (8) did. Student (11) made an omission error. (See Appendix (A), Table (2)).

In the second sentence, there is no semantic mistake. The MT raw output was understandable as much as possible. Only one terminology error was noticed 'covid19' was left untranslated into TL which should be '19 كوفيد' or 'كورونا'. Students (3,7, and11) did correct PE, whereas the rest did not. (See Appendix (A), Table (3)).

There are many semantic errors in the third sentence. The MT for 'There are many downsides of casinos but the upside is $700m+ recurring annually largely from tourists' was translated into

لكن الاتجاه الصعودي هو 700 مليون دولار + يتكرر سنويًا ، ثمة جانب 'which should be ,'إلى حد كبير من السائحين ايجابي هو الايرادات المتكررة التي تبلغ اكثر من 700 مليون دولار سنويا تاتي الى حد كبير من السياح الذين يذهبون الى كونيكت ونيوجرسي'. Only student number (7) had no PE error while most of the students had the same PE errors which were in accuracy and verity. (See Appendix (A), Table (4)).

The fourth sentence contained no errors, except one grammar error in the word 'that's money'. MT translated it into 'اموال' which should be 'الاموال'. Students (7, 9, and11) did correct PE, and the others reproduced the same MT error 'اموال'. (See Appendix (A) Table (5)).

In the fifth sentence, "NY and NYC' was machine translated into 'نيويورك ونيويورك' which should be 'نيويورك ومدينتها', and the word 'states' into 'الدول', which should be translated into 'الولايات'. Only students (7) and (12) did correct PE, whereas the others reproduced the same errors. Students (3)

and (8) had errors both in accuracy and fluency. (See Appendix (A) Table (6)).

5.Findings
It has been seen that most of the students' errors were in the category of the accuracy of language and verity. Additionally, students either did little PE or did not post-edit at all. The most common granular error type in the accuracy category was mistranslation.

5.1 Error Types
The following tables show the number of error types made by students. These errors were calculated according to the full form of (the SPSS) statistical program, alongside the percentage of each error. The granular error types are shown in the tables as (A) for accuracy, (F) fluency, (T) terminology, and (V) verity of language. (Missing) is used for those students who did not have an error in their PE, (Frequency) for the number of errors, and (Percent) for the percentage of each error in the whole text.

Table (1): The Most Common of Error Types in the Title

		Frequency	Percent
Valid	V	1	8.3
	A&V	10	83.3
	Total	11	91.7
Missing	System	1	8.3
Total		12	100.0

Table (2): The Most Common of Error Types in Sentence 1

		Frequency	Percent
Valid	A	1	8.3
	A &v	8	66.7
	A&F&V	3	25.0
	Total	12	100.0

Table (3): The Most Common of Error Types in Sentence 2

		Frequency	Percent
Valid	A	3	25.0
	T	6	50.0
	Total	9	75.0
Missing	System	3	25.0
Total		12	100.0

Table(4): The Most Common of Error Types in Sentence 3

		Frequency	Percent
Valid	V	1	8.3
	A&V	10	83.3
	Total	11	91.7
Missing	System	1	8.3
	Total	12	100.0

Table (5): The Most Common of Error Types in Sentence 4

		Frequency	Percent
Valid	F	6	50.0
Missing	System	6	50.0
	Total	12	100.0

Table)6): The Most Common of Error Types in Sentence 5

		Frequency	Percent
Valid	A	8	66.7
	A&F	2	16.7
	Total	10	83.3
Missing	System	2	16.7
	Total	12	100.0

5.2 Severity of Levels

According to TAUS, the Dynamic Quality Framework (DQF), it is usually not enough to know how many errors exist when evaluating PE. Evaluators also need to know (a) how severe they are and (b) how important the error type is for the task. Severity denotes the nature of the error and its effect on the usability of the PE. "The more severe an error is, the more likely it is to negatively affect the user in some fashion. Severity applies to individual errors, not to categories as a whole" (Moorkens et al., 2018, p.120).

• Critical errors are those that, by themselves, reduce a task unfit for its purpose.

• Major errors obscure the text's intended meaning in a way that prevents the intended reader from deriving that meaning from the text, although they are unlikely to be harmful.

• Minor errors are those that do not affect usability.

• Kudos: This level marks modifications that cannot be considered errors. For more clarification about the severity of levels, see appendix (B).

Note: The symbols in the table are used as follows: (C) critical, (Maj) major, (Min) minor, (N) neutral, and (K) kudos.

Table (7): The Severity Levels of the Most Common Error Types in the Title

		Frequency	Percent
Valid	Major	11	91.7
	K udos	1	8.3
	Total	12	100.0

Table (8): The Severity Levels of the Most Common Error Types in Sentence 1

		Frequency	Percent
Valid	Major	11	91.7
	Minor	1	8.3
	Total	12	100.0

Table (9): The Severity Levels of the Most Common Error Types in Sentence 2

		Frequency	Percent
Valid	Major	2	16.7
	Minor	7	58.3
	Kudo	3	25.0
	Total	12	100.0

Table (10): The Severity Levels of the Most Common Error Types in Sentence 3

		Frequency	Percent
Valid	Major	11	91.7
	Kudo	1	8.3
	Total	12	100.0

Table (11): The Severity Levels of the Most Common Error Types in Sentence 4

		Frequency	Percent
Valid	Minor	9	75.0
	Kudo	3	25.0
	Total	12	100.0

Table (12): The Severity Levels of the Most Common Error Types in Sentence 5

		Frequency	Percent
Valid	Major	10	83.3
	Kudo	2	16.7
	Total	12	100.0

CONCLUSIONS

The results showed that all students made errors when they post-edited the machine-translated journalistic text or reproduced the same MT errors. Therefore, according to this study, errors were present in all four categories: accuracy, fluency, terminology, and verity of language. More than half the total errors, 62%, were found in the accuracy of MT, and mistranslation was the highest value in this category. Fluency was the second in the number of errors, then verity, and finally, terminology, showing that students tend to accept the proposed terminology in MT. Unfortunately, raw MT output does not always satisfy the end user's expectations in terms of translation quality. Therefore, MT plus PE is a basic and standard practice. The results on the severity of levels showed that 62% of the errors were major and 23% of them were minor errors, and only 13% of the PE was kudos. However, lack of training and the absence of clear and regular guidelines may be the reason for their PE. The differences in the error types made by students may also point out ways to use MT more efficiently, which could have advantages beyond just enhancing the speed and accuracy of translations.

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