

Impact of Crowdsourcers' Education on Crowdsourcing Translation Quality: Post-Editing Machine Translation Output⁴

Marziyeh Khalilizadeh Ganjalikhani⁵

Abstract

This study investigates the impact of participants' educational backgrounds on the quality of post-edited machine-translated output in crowdsourced translation tasks. A closed-crowdsourcing model was implemented, utilizing the Telegram platform to engage participants from a specialized translation studies community. The educational degrees of 30 participants were analyzed, revealing a majority with advanced qualifications: 10 held Ph.D. degrees, 12 held Master's degrees, and 8 held Bachelor's degrees in translation studies. The findings suggest that while educational background is a valuable indicator, other factors such as professional experience and specialization may also influence post-editing effectiveness. The study shows that it is possible to collect useful data using crowdsourcing with strict quality control procedures, even with a relatively small sample size. The article makes recommendations for future research directions to investigate the intricate interactions among variables determining translation quality and emphasizes the significance of taking participants' educational levels into account in crowdsourced translation projects. The research also emphasizes the benefits of using a closed crowdsourcing methodology, such as improved quality control, confidentiality, and access to knowledge. This study advances our knowledge of translation quality in crowdsourcing contexts and offers suggestions for improving translation procedures in the future.

Keywords: Closed-group model, Crowdsourcing translation, Educational background, Machine translation, Post-editing

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5. Faculty Member, Department of Foreign Languages, Faculty of Tourism, Higher Education Complex of Bam, Bam, Kerman, Iran; email: marziyehkhalilizadeh@bam.ac.ir

1. Introduction

The term "crowdsourcing" was first coined in 2006 by American journalist Jeff Howe, who created this compound term by combining the words "crowd" and "outsourcing." Crowdsourcing, as a practice grounded in the collaborative nature of Web 2.0, has been used by businesses, companies, organizations, institutions, or a person to benefit from the work, ideas, or wisdom of the crowd on the Internet to accomplish any given task, and it can be a large group of amateurs, volunteers, experts, fans, etc. (Estellés et al., 2015; Jiménez-Crespo, 2017). According to Howe (2006), the term *crowdsourcing* is used to describe a diverse range of activities that take many forms. While this flexibility allows crowdsourcing to be a strong and productive approach, it is also challenging to describe and clearly characterize because it encompasses heterogeneous practices, varying participant roles and incentive structures, and lacks a single, agreed-upon theoretical definition (Estellés-Arolas & González-Ladrón-de-Guevara, 2012). Additionally, despite efforts like Brabham's (2008) typology and definition of crowdsourcing, the theoretical knowledge foundation is still insufficient. More and more researchers are using it as a component of their methodologies, and they are using it to inform everything from study design to participant recruitment and analysis (Khalilizadeh Ganjalikhani, et al., 2023). It has been utilized for issue-solving, data processing, surveillance/monitoring, and surveying, according to a systematic assessment of the field of health research (Ranard et al., 2014).

Crowdsourcing Translation (CT) is the process of using a large number of people's collective efforts to translate text, frequently through an open call (Howe, 2006). A smaller portion of a bigger translation project is worked on collaboratively by volunteers or paid contributors (Salam et al., 2017). Nowadays, CT is gaining popularity and dispensing with traditional translation models as service providers are looking for quick and affordable models to save time and money while delivering translation services (Azari et al., 2020). According to Anastasiou and Gupta (2011), CT satisfies these objectives because of its cost-effectiveness, rapidity, adaptability, and diverse operating methods. According to O'Hagan (2021), CT is a growing trend that takes advantage of the multilingualism of a large virtual population of internet users. It may be utilized in different situations based on the objectives and elements at play. Crowdsourcing solutions have been expanding technological translation workflows in a dynamic and user-friendly way. Crowdsourcing has the potential to have an impact on professional workflows and practices when approaches to collaboration, efficiency, or speed are transferred to the professional world, as

evidenced by the wide range of variation between existing platforms, which makes it possible to consider it the most vibrant and dynamic translational phenomenon of this decade (Jiménez-Crespo, 2017. p. 85).

According to Jiménez-Crespo (2013), one of the most prominent implementations of CT is localization; one example of this is Facebook localization. Additionally, it is employed to handle the vast volume of data that is generated these days by multiple corporations (Sutherlin, 2013). Gathering large amounts of annotated data for natural language processing is another use case for CT (Gao et al., 2015). Post-editing is an area that receives comparatively less attention, as demonstrated by Aikawa et al. (2012).

1.1. Theoretical Framework

This study is guided by the PACTE translation competence model, a well-established framework in translation studies that explains what translators need to know and be able to do. Developed by the PACTE research group, the model conceptualizes translation competence as a set of interrelated subcompetences such as bilingual, extra-linguistic, instrumental, and strategic competences acquired through education and training rather than being innate (Albir, 2015; Beeby et al., 2009). Studies show that these competences are linked to measurable differences in translation outcomes (Beeby et al., 2009; Quinci, 2015). While the model was developed for translation more broadly, its focus on education and skill acquisition provides a useful lens for studying competence in specific contexts, such as crowdsourced translation tasks.

1.2. Objective

Drawing on the PACTE translation competence model, this study explores the influence of participants' educational background on crowdsourced post-editing performance. Health-related texts were chosen as a high-stakes context, where translation errors can impact patient understanding and public health communication (Azari et al., 2018; Khalilizadeh Ganjalikhani et al., 2024). The study examines whether higher formal education leads to improvements in Accuracy, Fluency, and Appropriateness.

By linking educational level, translator subcompetences, and observable translation outcomes, the study contributes theoretically and provides practical guidance for designing effective closed-crowdsourcing tasks in contexts where

translation quality is critical. The central research question is: *"How does educational background influence post-editing quality in closed-crowdsourced translation tasks?"*

2. Literature Review

2.1. Crowdsourcing Translation as a Post-Editing Method (CTPE)

Post-editing of machine translation (MT) output is increasingly recognized as an effective approach to enhance translation quality while reducing time and costs in professional workflows (Aziz et al., 2012). Translators commonly use post-editing within Translation Memory (TM) tools such as SDL Trados™, Wordfast™, and Déjà Vu X2 TM, many of which now integrate MT systems. Beyond improving translations, post-editing also provides valuable data for assessing translation quality and diagnosing issues, and *crowdsourcing* can serve as an efficient complement to overcome limitations of traditional tools.

Although MT and crowdsourced translation (CT) are often treated separately, combining them can be highly effective. For instance, Aikawa, Yamamoto, and Isahara (2012) show that crowdsourced post-editing of MT enabled large-scale localization of Toyohashi University of Technology's English websites into nine languages within two months at low cost. This demonstrates the potential of integrating MT and crowdsourcing to create new opportunities in the translation industry.

This study emphasizes that MT, despite its promise, requires integration with professional translation practices and quality control to ensure accurate and effective communication. In particular, human post-editing of MT output can help mitigate linguistic issues in sensitive contexts such as health-related content.

2.2. Closed and Open Crowdsourcing Models

Scholars have proposed various classifications for collaborative translation practices based on parameters such as process objectives (DePalma & Kelly, 2011), community involvement (Mesipuu, 2012), and workflow structures (Morera-Mesa, 2014). CT is often categorized as open or closed, depending on the openness of participation (Mesipuu, 2012). In open models, anyone in the community can contribute, whereas closed models restrict participation to selected individuals, as seen in initiatives like Kiva or TED Talks. Hierarchical structures may emerge, with participants assigned roles according to their skills and experience; for example, professional translators in TED Talks were often promoted to community reviewers or

translation managers (Fuente, 2015).

This study employs a closed-crowdsourcing model, engaging participants with BA, MA, or Ph.D. degrees in Translation Studies. Beyond examining a standard closed group, the study aims to investigate whether participants' educational background significantly affects translation quality.

2.3. The Impact of Educational Degrees on Post-Editing

As discussed, one approach to enhancing translation quality is through a closed-crowdsourcing model, where participants are selected based on shared characteristics, such as educational background. Educational level has been considered to influence translation quality in crowdsourcing contexts. Zhang (2022) found that integrating crowdsourcing with translation teaching improves translators' abilities and yields higher-quality outputs. Similarly, Jaworski (2017) suggests that educating and motivating participants, including through gamification, enhances the quality of their contributions.

Jiménez-Crespo (2018) notes that the crowdsourcing revolution has shifted the conceptualization of translation quality toward process-based approaches and distributed responsibility. Collectively, these studies highlight the importance of a well-educated and motivated crowd for ensuring high-quality translations. Research specifically examining the effect of educational background on post-edited MT output supports this: Dunne (2022) and Aikawa (2012) demonstrate that crowdsourced post-editing is a feasible and effective method for MT evaluation, with Dunne emphasizing the benefits of full-document context and quality control.

3. Method

In this section, participants, materials, procedure, instruments, participants' educational background and data analysis are presented.

3.1. Participants, Sampling, and Materials

This study involved two participant groups and used purposive and stratified sampling methods. The first group included 30 volunteers from the Iranian Translation Studies Telegram Channel, a large online community of over 4,000 students, academics, and professional translators. Participants were purposively selected to ensure relevant translation expertise and diverse educational backgrounds, providing a heterogeneous sample for examining post-editing performance.

The second group consisted of three expert proofreaders with doctoral training in Translation Studies, affiliated with the Higher Education Complex of Bam, the University of Ottawa (Health Communication), and the University of Isfahan. These experts evaluated the quality of the post-edited translations.

Study materials were drawn from the Health Translations website, an initiative of the Victorian Government of Australia managed by the Centre for Culture, Ethnicity, and Health. Fifteen source documents were selected using stratified sampling to ensure diversity across health topics, text types, and complexity levels, resulting in a balanced dataset for assessing translation quality and post-editing needs in a high-stakes domain.

3.1.1 Crowdsourcers' Educational Background

The educational distribution of the crowdsourcers was as follows (Table 1): 12 participants held a Bachelor's degree (26.7%), 8 held a Master's degree (40%), and 10 held a Ph.D. (33.3%). This distribution reflects a heterogeneous pool of participants, encompassing varying levels of academic experience in translation studies.

Table 1. Educational Background of Crowdsourcers

Degree	Number of Participants	Percentage
B.A.	12	40%
M.A.	8	26.7%
Ph.D.	10	33.3%
Total	30	100%

3.2. Procedure

3.2.1. Machine Translation of Selected Documents

All 15 health-related documents were initially translated from Persian to English using Google Translate, chosen for its reliable Persian-English performance, free accessibility in Iran, and continuous improvements via neural updates. From the full translations, 30 specific instances were selected for post-editing.

3.2.2. Post-editing Selection

The researcher and three translation experts conducted a detailed analysis and identified 30 instances requiring post-editing. Selection was based on expert

consensus regarding accuracy, fluency, and contextual appropriateness. The collective judgment of four qualified experts was considered sufficient to ensure the validity and reliability of the identified instances, consistent with established practices in translation studies.

Since crowdsourcing tasks are generally designed as small, manageable units (Jiménez-Crespo, 2016), it was important to keep the task concise to sustain participant interest and focus. Previous research has shown that longer or overly demanding tasks may cause fatigue, reduce response quality, and discourage participation (Mao et al., 2013; Zhang et al., 2018). Therefore, selecting 30 instances was a deliberate choice to balance practicality and data quality, providing participants with a task substantial enough to yield meaningful post-editing insights while remaining realistic and engaging to complete. Table 2 presents a subset of 5 instances from the post-editing process, showing the original text, the Google Translate version, and the final post-edited version.

Table 2. The Instances Used in Crowdsourcing and the Final Post-Edited Version

Original Version	Google Translate Version	Final Post-Edited Version
Your GP is usually your main provider of health care.	پزشک عمومی شما معمولاً ارائه-دهنده اصلی مراقبت‌های بهداشتی شما است.	معمولاً پزشک عمومی مهم‌ترین فردی است که خدمات سلامت و بهداشت شما را فراهم می‌کند.
Adrenaline is the first line treatment for anaphylaxis.	آدرنالین خط اول درمان آنافیلاکسی (حساسیت شدید به پروتئین‌ها) است.	آدرنالین درمان اصلی آنافیلاکسی است.
Give them more frequent breastfeed.	به آنها شیرهای مکرر بدهید.	این نوزادان باید بیشتر از معمول، شیر مادر بخورند.
An asthma flare-up can become serious if not treated properly.	شعله‌ور شدن آسم در صورت عدم درمان مناسب می‌تواند جدی شود.	در صورت درمان نامناسب، آسم بطور جدی عود می‌کند، حتی در افرادی که معمولاً آسم را به خوبی کنترل می‌کنند.
Urinating or opening their bowels in places they should not.	ادرار کردن یا باز کردن روده‌ها در مکان‌هایی که نباید.	دستشویی کردن (ادرار یا مدفوع) در مکان‌هایی نامناسب.

3.2.3. Crowdsourcing Process

The researcher created a new Telegram channel and posted the 30 questions

requiring post-editing. The administrator of the Translation Studies Channel⁶ shared a link to the researcher's channel, inviting members to participate in the crowdsourcing process. A poll was conducted on the Translation Studies Channel, open for 48 hours, during which 30 members provided post-edited versions of translations for the 30 questions.

3.2.4. Proofreading and Quality Assessment

Post-edited versions that were identical were excluded and the remaining post-edited translations were evaluated by three expert proofreaders, each holding a Ph.D. in Translation Studies. They used the Multidimensional Quality Metrics (MQM) framework, which assesses translations across Accuracy, Fluency, and Appropriateness. Errors were classified as minor (small grammatical or lexical issues that did not affect understanding), major (errors that changed meaning or required significant correction), or critical (errors that made the translation incorrect or unintelligible).

To ensure fairness and consistency, disagreements among proofreaders were discussed until full consensus was reached, resulting in a single score per participant for each dimension. The identity of the post-editors was kept confidential to avoid bias. Because the final scores reflect expert consensus rather than independent ratings, inter-rater reliability measures such as Cohen's Kappa were not applicable. This consensus-based approach is widely accepted in translation studies and ensures a rigorous and transparent assessment of post-editing quality.

3.2.5. Participant Educational Degree Inquiry

After selecting the final post-edited versions, each participant was contacted by the researcher.

Participants were asked to provide information regarding their educational degree in the field of translation studies.

3.3. Instrument

The Telegram platform served as the instrument for data collection, enabling the efficient facilitation of the crowdsourcing process. Its structured interface allowed participants to post-edit translations and share their revisions seamlessly. Telegram

6. <https://t.me/IranianTranslationStudies>

was selected primarily due to its compatibility with the closed-crowdsourcer group, which was hosted on a Telegram channel. This choice ensured that participants could easily access and engage with the post-editing tasks within their familiar digital environment, enhancing the overall efficiency and effectiveness of the data collection process.

3.4. Data Analysis

The final post-edited translations were reviewed by three qualified proofreaders to assess the impact of crowdsourcers' educational background on post-editing quality. The evaluation adhered to the MQM framework (Lommel et al., 2018), a comprehensive system for translation quality assessment encompassing dimensions such as accuracy, fluency, and appropriateness, each with severity levels ranging from minor to critical. In this study, the proofreaders focused on the following key MQM dimensions:

Accuracy: Evaluating the faithfulness of the translation to the source text, ensuring that the meaning is preserved without omissions or additions.

Fluency: Assessing the grammatical correctness and naturalness of the target language, ensuring that the text reads smoothly and is free from syntactic errors.

Appropriateness: Considering the contextual and cultural suitability of the translation, ensuring that terminology and expressions are appropriate for the intended audience.

By utilizing the MQM framework, the analysis provided a systematic and reliable basis for identifying improvements in translation quality and linking them to participants' educational levels. This approach aligns with established practices in translation studies, where expert evaluation is recognized as a credible method for ensuring the quality and consistency of analytical decisions.

4. Results and Discussion

The post-editing tasks were conducted over a 48-hour period, from July 6th to July 8th, 2023, with active participation from 30 members of the Iranian Translation Studies Telegram channel. These participants produced post-edited translations for 30 selected instances. After removing duplicate submissions, the final dataset was reviewed by three qualified proofreaders using the MQM framework (Lommel et al., 2018), assessing accuracy, fluency, and appropriateness. The original questions and

the crowdsourcers' comments are available on the researcher's Telegram Crowdsourcing Channel⁷.

4.1 Post-Editing Quality Analysis

Using the MQM framework, proofreaders assigned scores to each post-edited instance across the three dimensions:

Accuracy: Faithfulness to the source text.

Fluency: Grammatical correctness and naturalness

Appropriateness: Contextual and terminological suitability.

Table 3. MQM-Based Post-Editing Performance by Educational Level

Educational Level	Accuracy (Mean ± SD)	Fluency (Mean ± SD)	Appropriateness (Mean ± SD)	Overall MQM Score (Mean ± SD)
B.A.	3.8 ± 0.5	3.5 ± 0.7	3.6 ± 0.6	3.63 ± 0.6
M.A.	4.2 ± 0.4	4.0 ± 0.5	4.1 ± 0.4	4.1 ± 0.4
Ph.D.	4.6 ± 0.3	4.4 ± 0.4	4.5 ± 0.3	4.5 ± 0.3

The analysis revealed a trend showing that participants with higher educational qualifications generally produced post-edited translations with fewer errors across all dimensions. Ph.D. holders achieved the highest average MQM scores, demonstrating greater attention to nuanced terminology and contextual appropriateness. Master's degree holders performed moderately, producing accurate translations but occasionally exhibiting minor fluency issues. Bachelor's degree holders showed a wider range of performance, with some high-quality contributions but more frequent minor errors.

Due to the small sample size and the consensus-based scoring of post-edited translations, inferential statistical tests were not conducted; the results are presented as descriptive trends. In future studies, with larger samples and independent ratings, inferential tests (e.g., Kruskal-Wallis) could be applied to examine potential differences between educational groups.

⁷ <https://t.me/+H1WQugQ4hyQzZWE8>

4.2 Interpretation and Implications

While participants with higher academic degrees generally achieved higher post-editing scores, many with lower degrees also produced translations of acceptable quality. This suggests that education influences performance but is not the only factor. Experience, familiarity with translation tools, and attention to detail might also play important roles as well. Although these factors were not directly measured, previous research shows that translation quality reflects a mix of formal education and practical skills (Zhang, 2022; Jaworski, 2017; Jiménez-Crespo, 2018). These findings show general trends rather than firm conclusions and suggest that future research should explore how education, experience, and technical skills might influence crowdsourced post-editing.

4.3 Crowdsourcing Insights

The closed-crowdsourcing approach facilitated the collection of high-quality post-edited translations from a relatively small but specialized group of participants. The use of Telegram as a platform enabled efficient task distribution and submission tracking. This study demonstrates that with structured quality control, expert review, and task design aligned with participants' expertise, crowdsourcing can reliably produce usable translation data, even with limited sample sizes.

5. Conclusions

In conclusion, this study aimed to investigate the association between the quality of post-editing machine-translated output in crowdsourced translation projects and the educational backgrounds of the participants. Specifically, it sought to determine if participants with Master's, Ph.D., or higher degrees in translation studies exhibit different levels of ability in post-editing texts that had been machine translated. By analyzing the educational backgrounds of participants and the associated quality of post-editing translations, this study contributes to a better understanding of the variables impacting translation quality in crowdsourcing environments.

The educational degree dispersion of those engaging in post-editing machine-translated texts for crowdsourced translation projects was showcased. Despite the participation of just forty-five crowdsourcers, less than 1% of the total population, the amount of data gathered was judged adequate to accomplish the goal of gathering post-edited versions. Interestingly, these crowdsourcers were a particular set of people with translation experience who gave their time freely, making their contribution

noteworthy.

The results suggest that crowdsourcing can produce valuable data from a small number of participants in translation research as long as strict procedures are followed to guarantee the accuracy of the data. Maintaining the data's quality and representativeness is essential, even with a small sample size. To ascertain whether the pattern regarding educational backgrounds and the efficacy of post-editing is statistically significant, more investigation is necessary. Exploring variables like professional experience and specialty that impact post-editing quality but are not related to schooling may shed light on the dynamics at work.

Moreover, the study revealed other advantages of using a closed crowdsourcing method, including higher quality control, confidentiality, access to knowledge, and cooperation. These benefits demonstrate how closed crowdsourcing may provide translation projects of a better caliber, especially when confidential data is involved or specialist knowledge is needed.

In summary, educational background is an effective measure of a person's familiarity with and expertise in translation studies; nevertheless, it should be taken into account in conjunction with other variables to offer a thorough evaluation of post-editing efficacy. Subsequent studies might investigate the relationship among training backgrounds, real-world experience, and contextual elements to provide more sophisticated methods of assessing translation quality in crowdsourcing settings.

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