

# The GAMETRAPP project: Spanish scholars' perspectives and attitudes towards neural machine translation and post-editing

**Cristina Toledo-Báez**

Research Institute on Multilingual Language  
Technologies  
University of Málaga  
Spain  
toledo@uma.es

**Luis Carlos Marín-Navarro**

Research Institute on Multilingual Language  
Technologies  
University of Málaga  
Spain  
lmarin@uma.es

## Abstract

The GAMETRAPP project (2022-2025), funded by the Spanish Ministry of Science and Innovation and led by the University of Málaga, aims to introduce and promote post-editing (PE) practices of machine-translated research abstracts among Spanish scholars. To this aim, the GAMETRAPP project is developing a gamified environment — specifically, an escape room—integrated into a responsive web app. As part of the design of both the gamified environment and the web app, this paper presents the results of a questionnaire distributed to Spanish scholars in order to explore their perspectives and attitudes towards neural machine translation (NMT) and PE. A total of 253 responses were collected from scholars affiliated with 42 Spanish public universities. A two-stage participant selection process was applied: the analysis focuses on scholars who self-reported a CEFR level of C1 or C2 in English proficiency. ( $n = 152$ ), and, within this group, a comparison was conducted between scholars from linguistic disciplines (23%,  $n = 35$ ) and those from non-linguistic disciplines (77%,  $n = 117$ ). Statistically significant differences between these groups were identified using the Mann-Whitney U test in IBM SPSS. The results indicate a widespread and continued use of language technologies, particularly those related to NMT. However, only 34.2% of scholars from non-linguistic disciplines are familiar with PE as a concept, although 59.8% report that they do post-edit their scientific abstracts. Furthermore, 62.9% of scholars from linguistic disciplines and 47.9% from non-linguistic disciplines believe it is necessary to create an app that trains scholars in post-editing Spanish abstracts into English. Sentiment analysis conducted with Atlas.ti on the 29 qualitative responses to the open-ended question suggests overall neutral attitudes toward NMT and PE for

both groups of scholars. In conclusion, while both groups engage with NMT tools, there is a clear need for training—especially among scholars from non-linguistic disciplines—to familiarize them with PE concepts and to help develop basic PE literacy skills.

## 1 Introduction and related work

Technology, particularly artificial intelligence (AI), plays a major role in shaping modern life, enabling numerous applications transforming various fields (Zhang et al., 2021). Translation technology has advanced significantly, driven by innovations like NMT (Sánchez Ramos and Rico Pérez, 2020) and pre-trained large language models (LLMs) (Brown et al., 2020). These AI-based methods have led to the development of a new generation of tools for translation and language services, including real-time language translation and communication through conversational chatbots such as ChatGPT (OpenAI, 2022; Jiang and Zhan, 2024; Rivas Ginel and Moorkens, 2024).

These myriads of resources and tools, combined with the growing globalization and interconnectivity, have led to NMT being deeply embedded in a wide range of professional, interpersonal, and social exchanges across the globe. As NMT is increasingly used by a wider number of people, initiatives such as the Machine Translation Literacy project (Bowker and Buitrago, 2019) and the MultiTrainNMT project (Kenny, 2022) have emerged with the aim of promoting NMT, training in NMT literacy, and raising awareness about the critical use that this technology requires.

One of the primary reasons for the growing demand for NMT arises from the increasing multilingualism in a society that requires seamless communication across multiple languages. However, this multilingualism clashes with the growing dominance of English as the lingua franca in research communication and international academic publishing (Curry and Lillis, 2019). The dominance of English, coupled with the global rise of the publish-or-perish culture in academia, is pushing scholars from both Anglophone and non-Anglophone countries to publish in English. The latter are currently referred to as English as an additional language (EAL) scholars (Zou et al., 2023) in the case of English for Research Publication Purposes (Flowerdew and Habibie, 2022).

The disparities resulting from the use of English as the dominant language in scholarly publishing are becoming more evident across various disciplines (Bowker, 2024). For instance, Amano et al. (2023) found that non-native English speakers spend considerably more time, effort, and money on reading and writing articles in English. To overcome the challenges of publishing in English and considering the improving quality of NMT output, scholars increasingly rely on MT—whether through NMT, LLMs, or chatbots—to write and translate their papers. Despite the high quality of results, it is still recognized that MT output generally requires PE to achieve a publishable quality. Defined, according to ISO 18587:2017, as “editing and correcting the output of a machine translation”, the combination of NMT+PE in scholar communication has already been explored. For instance, Goulet et al. (2017) examined the use of NMT as a tool for composing academic texts in EAL, working with a group of ten researchers. Similarly, Parra Escartín et al. (2017) conducted a survey on the use of NMT by medical practitioners, subsequently analyzing their post-edits and assessing the final quality with the help of a professional proofreader. Other studies, such as those by O’Brien et al. (2018) and Parra Escartín and Goulet (2020), also conducted experiments aimed at exploring the relationship between NMT and PE, focusing on the quality and nature of the post-editing outcomes in each case.

Against the backdrop of scientific dissemination in English as EAL and the use of NMT+PE, the GAMETRAPP project (Toledo-Báez and Noriega-Santiañez, 2024) is developing a web application

that incorporates a gamified environment, specifically a virtual escape room, to introduce and promote the PE of research abstracts translated from Iberian Spanish to American English (L1 to EAL). While other applications, such as Kaninjo (Moorkens et al., 2016), have been developed to train users in PE, GAMETRAPP stands out by introducing gamification as an innovative strategy to engage users in the PE learning process. A key aspect when designing both a gamified environment and a web app is focusing on user needs and motivation (Herzig et al., 2015). Since the potential users of the GAMETRAPP gamified environment and web app are Spanish scholars, a questionnaire was created and distributed to collect information on the methodology followed by scholars in Spain when writing and/or translating abstracts of their scientific publications.

For a participant-oriented study, it is common practice to use the term ‘survey’ to describe the study design, while the ‘questionnaire’ is seen as an instrument (Saldanha and O’Brien, 2014). A significant number of surveys and questionnaires about use of NMT and/or PE have already been conducted with professional translators (see Gaspari et al., 2015; Moorkens and O’Brien, 2017; Álvarez-Vidal et al., 2020; Canavese and Cadwell, 2024; Toledo-Báez, 2024, among others) and also with translation students (González Pastor, 2021; Zhang, 2023) and humanities students in general (Bowker, 2020; Dorst et al., 2022). However, aside from the aforementioned study by Parra Escartín et al. (2017), surveys and questionnaires regarding the use of NMT and/or PE by non-translators or non-linguists remain relatively limited. Anazawa et al. (2013) explored how Japanese nursing professionals used MT to access information from international journals. Their questionnaire results showed that more than half of participants found MT usable, and the study concluded that language proficiency is a key factor for the effective use of MT. Another study is Nurminen (2020), who interviewed nine Scandinavian patent professionals about their use of raw NMT in their professional practice, concluding that their use of NMT was both widespread and long-term.

The aim of this paper is to present the methodology and results of the questionnaire developed for the GAMETRAPP project, with a particular focus on the similarities and differences between scholars from linguistic and non-linguistic disciplines. It serves as a report on the user needs

analysis, reflecting the perspectives and attitudes of both groups of Spanish scholars toward NMT and PE.

## 2 Methodology

### 2.1 Research questions

Considering the introduction and the goal of creating a gamified environment and a web app to introduce and promote the PE of research abstracts among Spanish scholars, we present the following three research questions:

**RQ1:** How widespread is the use of NMT within Spanish scholars?

**RQ2:** How familiar are Spanish scholars with PE?

**RQ3:** To what extent is a training application for the PE of research abstracts from Spanish into English perceived as useful by Spanish scholars?

Both RQ1 and RQ2 will allow the as-is situation for Spanish scholars to be documented. RQ3 may provide relevant insights to the usefulness of an app for training on PE.

### 2.2 Questionnaire description

The questionnaire was designed using Google Forms and underwent a two-step validation process: first, by five experts—three scholars in Translation Studies and two scholars in Statistical Sciences— and, second, by the Ethics Committee for Experimentation at the University of Málaga. It was distributed in Spanish language<sup>2</sup> to scholars from all public and private universities in Spain. It was launched in mid-September 2024 and closed at the end of January 2025. To facilitate participation, various contact networks, LinkedIn, and mailing lists were used to invite Spanish scholars to complete the questionnaire.

A total of 253 responses were collected from scholars across 42 institutions, including Spanish public and private universities as well as research centers. Of these 42 institutions, 41 are public universities, representing approximately 98% of all public universities in Spain —demonstrating a strong level of representativeness. To analyze and present the questionnaire results, a two-stage participant selection process was applied. First,

only participants who self-reported a Common European Framework of Reference for Languages (CEFR) level of C1 or C2 in English proficiency ( $n = 152$ ) were selected, as these levels reflect advanced English language skills. Within this group, a further distinction was made between scholars from linguistic disciplines ( $n = 35$ , 23%) —specifically from the area of Linguistics, Translation, and Language Studies— and those from non-linguistic disciplines ( $n = 117$ , 77%), described all in Section 3.1. This distinction was made to explore the similarities and differences in the use of and familiarity with NMT and PE between scholars from linguistic and non-linguistic disciplines. Therefore, the analysis of this paper focuses on the responses of the 152 scholars who self-reported a CEFR level of C1 or C2 in English proficiency, comparing, in addition, responses from the 35 scholars from linguistic disciplines to those from the 117 scholars from non-linguistic disciplines.

The comparison between these two groups of scholars is further supported by a statistical significance test. Given that the results from the Kolmogorov–Smirnov test indicated a significant deviation from normality ( $p < 0.001$ ), the non-parametric Mann-Whitney U test was employed in IBM SPSS to assess whether the differences between the two groups of scholars are statistically significant. A result is considered statistically significant if the  $p$ -value is less than 0.05 ( $p < 0.05$ ).

The questionnaire consisted of two Sections. In the first one, all the demographic data of the participants were collected through 9 close-ended questions covering the following aspects:

- a) general information about the participant (gender, age, position, years of experience, etc.)
- b) areas of scientific production
- c) mother tongue(s) and foreign/additional languages
- d) self-reported English proficiency level

The second Section focuses on examining the methodology followed by Spanish scholars when writing and/or translating the abstracts of their scientific publications. This section includes a

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<sup>2</sup> As the original questionnaire was drafted in Spanish, the English version is available at the following link: [Access to the questionnaire](#).

significantly larger number of questions—18 in total—comprising 17 closed-ended and 1 open-ended item. The information collected covers the following aspects:

- a) frequency of publication in English and Spanish
- b) frequency of requests for an abstract in English
- c) perceived ease of writing in and/or translating into English
- d) use and perception of language technologies (NMT tools, online dictionaries, chatbots, parallel corpora, etc.)
- e) use of external services of professional translators and/or post-editors
- f) familiarity with PE concept
- g) usefulness of an app to train on the PE of abstracts from Spanish into English
- h) an open-ended item to gather voluntary additional comments on the questionnaire or any aspect of NMT or PE deemed relevant.

### 3 Results

#### 3.1 Participants' background

The areas of scientific production for the 152 scholars selected (see Section 2.2.) are diverse, with some fields standing out more than others. Scholars from the linguistic disciplines—specifically within the area of Linguistics, Translation, and Language Studies—constitute the largest group (23%), followed by the scholars from Engineering and Architecture (21.9%), Social Sciences (12.6%), and Biomedical Sciences (7.7%). Other disciplines are represented to a lesser extent such as Law (6.6%), Sciences (6%), Maths and Physics (5.5%), Biology (5.5%), Chemistry (4.4%), Economics (4.4%), Natural Sciences (2.2%) and History, Geography and Arts (0.6%).

Concerning mother tongue(s), the predominant language is Spanish (85.6%), followed by other co-official languages of Spain, such as Catalan (8.2%) and Galician (1.2%). Other native languages reported include French (1.9%), Portuguese (1.9%), and English (1.2%). The most widely spoken foreign languages among respondents are English (67.8%), French (13.7%), and Italian

(9.7%), followed by German (5.6%) and Portuguese (3.2%) at lower percentages.

#### 3.2 Frequency of publication in English

As shown in Figure 1, scholars from linguistic disciplines are more frequently required to provide an abstract in English. A total of 54.3% ( $n = 19$ ) report that they are 'Always' asked to provide an English abstract. The remaining respondents indicate that they are 'Usually' (31.4%,  $n = 11$ ) or 'Sometimes' (11.4%,  $n = 4$ ) asked to do so. The lowest percentage—2.9% ( $n = 1$ )—corresponds to those scholars who never publish in Spanish.

In contrast, responses from scholars in non-linguistic disciplines show a more balanced distribution. A total of 51.2% ( $n = 60$ ) report being asked to provide an abstract in English, with equal proportions stating they are 'Usually' (25.6%,  $n = 30$ ) or 'Always' (25.6%,  $n = 30$ ) required to do so. Notably, 23.9% ( $n = 28$ ) indicate that they do not publish in Spanish—a higher proportion than among scholars from linguistic disciplines—suggesting a greater need for translation or academic writing in English among non-linguists. The remaining respondents from non-linguistic disciplines report being less frequently asked for an English abstract: 19.7% ( $n = 23$ ) are 'Sometimes' asked, and 5.1% ( $n = 6$ ) are 'Never' asked to provide one. The comparison between two groups of scholars regarding the frequency of publication in English does not yield statistically significant results ( $p = 0.944$ ).

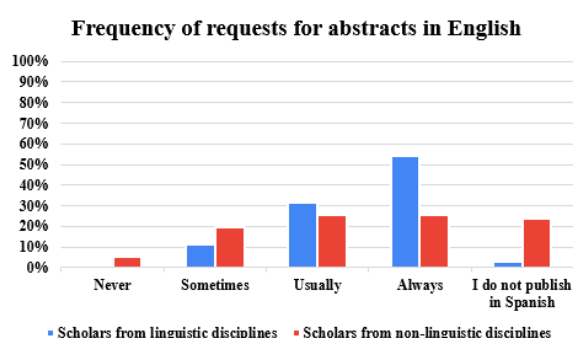


Figure 1: Frequency of requests for abstracts in English

When it comes to writing in English and/or translating abstracts into English, more than half of scholars from both linguistic and non-linguistic disciplines report that they find it not difficult. Specifically, 68.6% ( $n = 24$ ) of scholars from linguistic disciplines and 53% ( $n = 62$ ) of those from non-linguistic disciplines indicate no difficulty. A number of participants report only

minimal difficulties: 17.1% ( $n = 6$ ) of linguistic scholars and 38.5% ( $n = 45$ ) of non-linguistic scholars. The proportion of scholars who find it difficult is relatively small, with 14.3% ( $n = 5$ ) from linguistic disciplines and 8.5% ( $n = 10$ ) from non-linguistic disciplines reporting difficulty. No statistically significant differences were found between groups in relation to writing in English and/or translating abstracts into English ( $p = 0.241$ ).

### 3.3 Perception and use of technological tools

Scholars from non-linguistic disciplines use NMT tools more frequently (78.6%,  $n = 92$ ) than scholars from linguistic disciplines (71.4%,  $n = 25$ ). Although the difference between the two groups is not statistically significant ( $p = 0.376$ ), the results suggest that non-linguists tend to rely more heavily on NMT tools for translating their work. In contrast, linguists appear to be more critical of such tools and are more likely to use alternative methods.

Regarding the use of specific tools, scholars from linguistic disciplines show a stronger preference for online dictionaries, with a higher usage rate (60%,  $n = 21$ ) compared to scholars from non-linguistic disciplines (50.4%,  $n = 59$ ). Although the difference is not statistically significant ( $p = 0.321$ ), this suggests that linguists tend to place greater emphasis on lexical precision and terminology accuracy.

Concerning the use of chatbots, a notable similarity is observed between the two groups: 48.6% ( $n = 17$ ) of scholars from linguistic disciplines and 47% ( $n = 55$ ) of scholars from non-linguistic disciplines. This balance, although it is not statistically significant ( $p = 0.871$ ), suggests that the multi-disciplinary nature of these emerging conversational assistants—used not only for linguistic tasks but also for their interactive features—appeals equally to both linguistic and non-linguistic scholars. A notably higher proportion of linguists (31.4%,  $n = 11$ ) use parallel corpora in contrast to non-linguists (19.7%,  $n = 23$ ), highlighting that linguists are more inclined to work with corpora for comparative linguistic studies, ensuring terminological consistency, or validating translations. However, the differences between the two groups are still not statistically significant ( $p = 0.144$ ). Other tools, such as Grammarly and IATE, are used exclusively by scholars from non-linguistic disciplines, with

3.4% ( $n = 4$ ) using Grammarly and 0.9% ( $n = 1$ ) using IATE. However, the differences observed in the data are not statistically significant ( $p = 0.269$ ).

Only 6 scholars from linguistic disciplines (17.1%) and 8 from non-linguistic disciplines (6.8%) reported using no technological tools. The difference, while close to statistical significance ( $p = 0.065$ ), is still not significant.

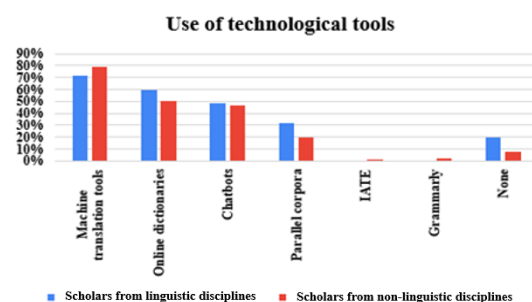


Figure 2: Use of technological tools

### 3.4 Knowledge and use of NMT and PE

According to the data obtained from the questionnaire analysis, it is evident that the concept of PE is largely unfamiliar to scholars outside of linguistic fields. Specifically, 65.8% ( $n = 77$ ) of non-linguists are unaware of PE, compared to 34.2% ( $n = 40$ ) who are familiar with the concept. In contrast, more than 90% ( $n = 33$ ) of linguists are familiar with PE. This is the only variable with a statistically significant difference ( $p < 0.001$ ), suggesting academic background plays a strong role in familiarity with PE. Linguists are significantly more likely to recognize or understand the concept than their non-linguistic counterparts.

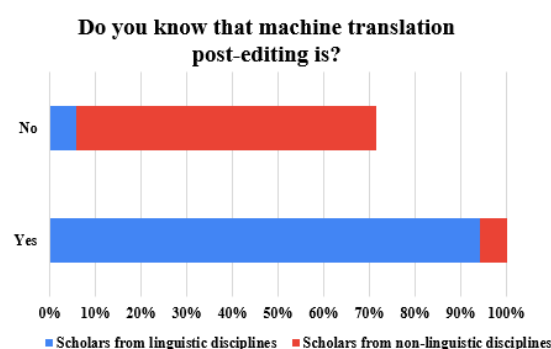


Figure 3: Do you know what machine translation post-editing is?

The data shown in Figure 4 below, based on experience with post-editing machine-generated translations, reveals that 88.6% ( $n = 31$ ) of scholars from linguistic disciplines have post-edited a



machine-generated translation at some point, while 11.4% ( $n = 4$ ) have not. In contrast, among scholars from non-linguistic disciplines, 73.5% ( $n = 86$ ) have post-edited a machine-generated translation, while 26.5% ( $n = 31$ ) have not been involved in this process. This is noteworthy, especially given that, as observed in Figure 3, more than 50% of these scholars are unfamiliar with the concept of post-editing. Although the statistical significance is close to 0.05 ( $p = 0.064$ ), it remains nonexistent. Nonetheless, these results suggest that, while the majority of both groups have experience with post-editing, scholars from linguistic disciplines tend to have a higher rate of involvement in this activity, likely due to their deeper understanding of MT processes.

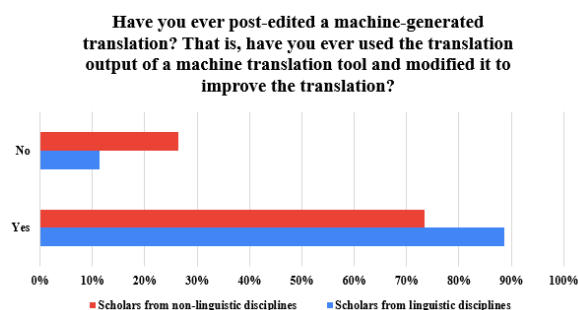


Figure 4: Have you ever used the machine-generated translation output of a machine translation tool and modified it in order to improve the result?

The statistics regarding PE of scientific abstracts reveal that, among scholars from linguistic disciplines, 74.3% ( $n = 26$ ) have engaged in post-editing a scientific abstract, while 25.7% ( $n = 9$ ) have not. In comparison, among scholars from non-linguistic disciplines, 59.8% ( $n = 70$ ) have experience in post-editing scientific abstracts, while 40.2% ( $n = 47$ ) have not participated in this activity. The statistical significance of this difference remains nonexistent ( $p = 0.121$ ). These results suggest that, although both groups engage in post-editing scientific abstracts to a notable extent, scholars from linguistic disciplines have a higher rate of participation, indicating a potential correlation between linguistic knowledge and the practice of post-editing scientific texts.

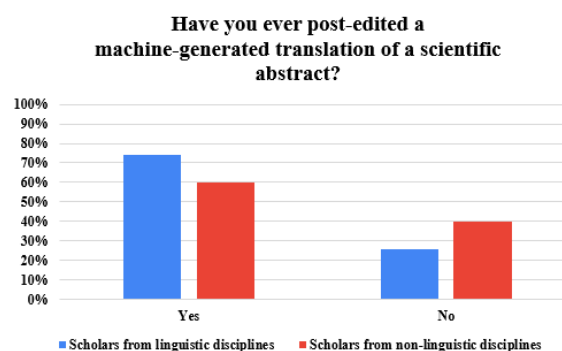


Figure 5: Have you ever post-edited a machine-generated translation of a scientific abstract?

### 3.5 Quality of NMT

The data reveal little differences in how the two groups of scholars rate the quality of NMT. Scholars from linguistic disciplines tend to rate the translation more leniently, with 57.1% ( $n = 20$ ) deeming it 'Good', 21.4% ( $n = 6$ ) rating it as 'Fair', and only 7.1% ( $n = 2$ ) considering it 'Excellent'. Notably, there were no 'Poor' ratings from this group, suggesting they find the quality acceptable, though not outstanding. Scholars from non-linguistic disciplines also give a generally positive rating, with 70.8% ( $n = 51$ ) considering it 'Good', and 6.9% ( $n = 5$ ) rating it as 'Excellent', a percentage similar to that of linguistic scholars. Additionally, 22.2% ( $n = 16$ ) rated it as 'Fair', and, like the linguistic group, no 'Poor' ratings were given. Overall, both groups rated NMT positively, and the slight differences between them were not statistically significant ( $p = 0.931$ ).

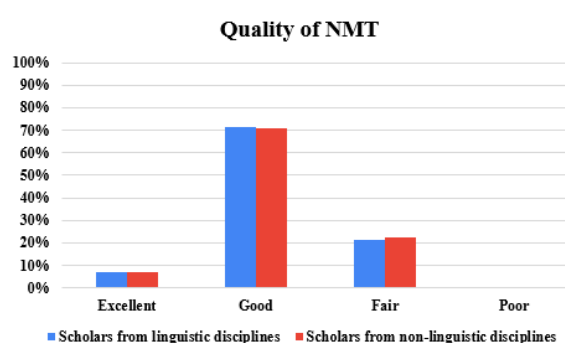


Figure 6: Quality of NMT

### 3.6 Usefulness of a training app for the PE of research abstracts from Spanish into English

Among scholars from linguistic disciplines, the majority (62.9%,  $n = 22$ ) found an app designed to familiarize scholars with the PE of abstracts from Spanish into English to be 'Very useful', while a

smaller percentage (22.9%,  $n = 8$ ) considered it ‘Useful’. Only 14.3% ( $n = 5$ ) rated it as ‘Not useful’, and no one marked it as ‘Not useful at all’. In contrast, responses from scholars in non-linguistic disciplines were more varied: 47.9% ( $n = 56$ ) found it ‘Very useful’, 30.8% ( $n = 36$ ) rated it as ‘Useful’, 16.2% ( $n = 19$ ) deemed it ‘Not useful’, and 5.1% ( $n = 6$ ) considered it ‘Not useful at all’. Although there is no statistical significance between the two groups ( $p = 0.112$ ), the results suggest that linguists are more likely to view the potential app very positively, while scholars from non-linguistic disciplines rate it more neutrally, but still somewhat positively.

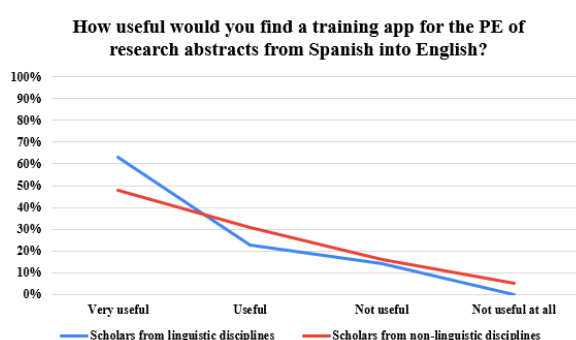


Figure 7: How useful would you find a training app for the PE of research abstracts from Spanish into English?

### 3.7 Sentiment analysis of open-ended question

A total of 29 qualitative responses (4 from scholars in linguistic disciplines and 25 from scholars in non-linguistic disciplines) were provided in response to the voluntary open-ended question, which sought additional comments on the questionnaire or any aspect of NMT or PE deemed relevant. A sentiment analysis was conducted with Atlas.ti in order to classify scholars’ opinions. According to Luo et al. (2013), sentiment analysis, also known as opinion mining, uses natural language processing, computational linguistics and text analytics to identify and classify personal opinions in content sources, such as documents or sentences. The main goal of sentiment analysis is

to determine the author’s attitude on a specific topic or the general polarity of a document. The degree of sentiment will be determined by this polarity, i.e. a high positive score would indicate positive sentiment, while a low negative score would indicate negative sentiment. Neutral sentiment would be set at an intermediate score.

The sentiment analysis reveals that scholars from linguistic disciplines tend to comment more negatively: of the 4 comments in total, 3 express a negative attitude, and only 1 is neutral. Below we will present the English translation of a negative comment and a neutral comment chosen as examples:

Neutral comment: “1- I believe that chatbots (e.g., ChatGPT, Claude) that allow us to ask for help in translating and improving text, as opposed to traditional machine translation systems that lack the flexibility for interaction, already produce much better results. 2- In these cases, I wouldn’t call it post-editing but rather focusing on how to write effectively (tone, precision, content, register, etc.). I think it’s important to learn how to interact with Large Language Models (LLMs), including prompting, as well as developing the critical skill to read their responses and identify areas for improvement.” (R210)<sup>3</sup>.

Negative comment: “If they don’t have any idea of L2 it won’t do them any good. They need linguistic competence, and this post-editing gives you ideas on how to write, change a linker or something like that.” (R14)<sup>4</sup>.

In contrast, scholars from non-linguistic disciplines adopt a more neutral perspective: out of 25 comments, 14 are neutral, 9 are negative, and only 2 are positive. Below we will present the English translation of three comments (one positive, one negative and one neutral) chosen as examples:

<sup>3</sup> Original quote in Spanish: “1-Creo que hoy en día proporcionan ya resultados mucho mejores los chatbots (chatGPT, Claude, etc.) a los que podemos pedir que nos vayan ayudando a traducir y mejorar el texto, en lugar de utilizar sistemas de TA que no ofrecen la flexibilidad de ‘interactuar’”. 2-En estos casos, no hablaría tanto de poseditar, sino de cómo redactar bien (tono, precisión, contenido, registro, etc.). Creo que es importante aprender a interactuar con los LLM, el

prompting, así como desarrollar la capacidad crítica para leer su respuesta e identificar los puntos que mejorar”.

<sup>4</sup> Original quote in Spanish: “Si no tienen ni idea de la L2 no les va a servir de nada. Necesitan competencia lingüística y esta posesión al final lo que te da es ideas de redacción, cambiar algún linker o cosas del estilo.”

Positive comment: “Pre-writing either in Spanish or English is essential to produce a good text in English.” (140)<sup>5</sup>.

Neutral comment: “I always consider it important that NMT should correct and help the researcher improve their English level or at least simplify the task of summarizing (with subsequent review). However, I do not believe that any technology should replace the need for a researcher to have a C1 level of English. Finally, it is important that a tool can be used proactively, rather than passively.” (R7)<sup>6</sup>.

Negative comment: “With AI tools I don't know if an application would be necessary.” (R150)<sup>7</sup>.

This difference among the two groups of scholars suggests that scholars from linguistic disciplines may be more critical of NMT and PE, likely due to their deeper familiarity with the challenges in these areas. Their views may reflect concerns about the limitations of NMT and the complexity of PE. On the other hand, scholars from non-linguistic disciplines seem to take a more relaxed approach, focusing less on the technical aspects of NMT and PE. Despite these differences, both groups share concerns about the effectiveness and quality of MT and PE. This contrast underscores the influence of educational and academic background on perceptions of technological developments in the field of translation.

## 4 Conclusions

This paper provides an overview of Spanish scholars' perspectives and attitudes towards NMT and PE through a questionnaire in which 253 Spanish scholars from 42 institutions participated. In order to analyze and present the questionnaire results, a two-stage participant selection process was applied. First, only participants who self-reported a CEFR level of C1 or C2 in English proficiency ( $n = 152$ ) were selected, as these levels reflect advanced English language skills. Within this group, a further distinction was made between

scholars from linguistic disciplines (23%,  $n = 35$ ) and non-linguistic disciplines (77%,  $n = 117$ ).

To address RQ1, data from our questionnaire indicate a widespread adoption of language technologies within the scientific community, with a particular preference for NMT tools among both scholars from non-linguistic disciplines (78.6%,  $n = 92$ ) and scholars from linguistic disciplines (71.4%,  $n = 25$ ). When compared to other studies, these results show a notable divergence. For instance, Moorkens and O'Brien (2017) found that only 18% of professional translators reported using NMT, and more than half of the respondents (56%) considered NMT to be “still a problematic technology”. In contrast, the study by Canavese and Cadwell (2024) reported significantly higher usage rates, with 50.2% of respondents using NMT daily and 22.3% using it several times a week. The discrepancy may be partly explained by the six-year gap between them, reflecting the rapid evolution of NMT technologies. Nevertheless, neither study fully aligns with the findings of the present research, where 71.4% of scholars from linguistic disciplines reported using NMT.

When comparing our data on scholars from non-linguistic fields with those reported in Parra Escartín et al. (2017)—which focused on medical practitioners using NMT for academic writing support—we observe a strong similarity in NMT usage (68% in our study vs. 78.6% in theirs). The study by Anazawa et al. (2013), which also involved professionals in the health sciences, reports comparable findings: 65.8% of respondents use NMT to some extent, either ‘Occasionally’ (43.4%) or ‘Always/almost always’ (22.4%). These results align closely with those of Nurminen (2020), which highlight the widespread and long-term use of raw MT among respondents. Taken together, these findings suggest that reluctance and mistrust toward NMT are more pronounced among translation professionals and students than in other academic or professional fields.

Regarding RQ2, our study revealed a notable lack of awareness of PE, particularly among scholars from non-linguistic disciplines, with

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<sup>5</sup> Original quote in Spanish: “La redacción previa ya sea en castellano o inglés es fundamental para tener un buen texto en inglés.”

<sup>6</sup> Original quote in Spanish: “Siempre considero importante que la traducción automática debe corregir y ayudar al investigador a perfeccionar su nivel de inglés o en todo caso a simplificar la tarea de resumir

(con revisión posterior). Pero no considero que ninguna tecnología deba suplir la necesidad de cualquier investigador de tener un C1 de inglés. En definitiva, es importante que se haga un uso proactivo de la herramienta y no tanto pasivo.”

<sup>7</sup> Original quote in Spanish: “Con las herramientas de IA no sé si una aplicación sería necesaria.”



65.8% reporting unfamiliarity with the concept. However, a majority of them (73.5%) indicated that they had engaged in PE at some point to improve NMT output. Furthermore, 59.8% of respondents from non-linguistic fields reported using PE specifically to enhance the quality of machine-translated scientific abstracts. The only prior study offering data on specific PE usage in scholarly communication is that of Parra Escartín and Goulet (2017: 260), which indicates that 26% of respondents use NMT “to obtain a preliminary English version they could subsequently post-edit.” However, the study does not clarify how these scholars engage in PE, making direct comparison with our PE-related findings difficult and, in most cases, not feasible.

In relation to RQ3, the results suggest that scholars from linguistic disciplines are more likely to view a training app for the PE of abstracts from Spanish into English very positively. In contrast, scholars from non-linguistic disciplines tend to evaluate it more neutrally, though still with a generally positive outlook. As no previous studies have focused on the development of an app for PE, our results cannot be directly compared with existing research.

Our study has three main limitations that should be acknowledged. First, the total number of responses from scholars in linguistic disciplines was significantly smaller than that from scholars in non-linguistic fields. This imbalance was anticipated, as our focus was limited to a single area within the linguistic disciplines—namely, Linguistics, Translation, and Language Studies—compared to a total of 11 non-linguistic disciplines included in the study. Second, the overall response rate for the open-ended question was notably low, which can be attributed to its voluntary and unstructured nature. Third, the questionnaire did not offer respondents alternative methods for teaching basic PE skills. Only one option was presented, which limited the opportunity to compare it with other potential approaches to introducing and promoting PE.

The findings of this study point to at least two promising directions for future research. First, it would be valuable to explore alternative methods for teaching basic PE literacy skills, particularly to scholars from non-linguistic disciplines, as well as to other professionals or even the general public. GAMETRAPP introduces gamification as an innovative strategy to engage users in the PE

learning process, and further studies will be conducted to assess its effectiveness. Second, it would be pertinent to investigate how PE literacy and skills evolve in the context of AI. The increasing use of NMT and LLMs for translation purposes could suggest that PE skills are becoming integrated into broader AI literacy (knowledge and skills) and AI competency (confidence and effectiveness) (Chiu et al., 2024). The integration of AI literacy and competency will become increasingly essential for effectively and responsibly navigating the digital transformation, necessitating particular emphasis on PE.

## 5 Acknowledgements

The GAMETRAPP project (TED2021-129789B-I00/AEI/10.13039/501100011033/Unión Europea NextGenerationEU/PRTR) is funded by the Spanish Ministry for Science and Innovation under the Ecological Transition and Digital Transition Call 2021.

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