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THEORETICAL ARTICLE

Machine translation and postediting in the didactics of translation and interpreting

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Abstract

Introduction: This paper presents the results of an educational experience within the framework of POSEDITrad, an educational innovation project that incorporates the use of machine translation and postediting in the translation classroom within the Degree of Translation and Interlinguistic Mediation at the University of Valencia (Spain). **Theoretical framework:** Technology and machine translation are envisaged as helpful tools that can enhance both the translation process and the students' translation competence. ***Procedure:*** This curricular innovation includes the design and implementation of a series of activities that provide students with the necessary tools, techniques and procedures in machine translation and post-editing to fulfil translation market demands and foster students' technological competence. **Discussion:** The benefits of this teaching innovation are associated with an increase in student's employability. Similarly, this experiment paves the way for an innovative curriculum design in the field of translation didactics.

Keywords: machine translation; technology; educational innovation; translation didactics; qualitative research.

MPOSEDITrad: la traducción automática y la posedición para la formación de traductores e intérpretes

Resumen

Introducción: En este artículo se presentan los resultados de la experiencia docente realizada en el marco del Proyecto de Innovación Docente POSEDITrad, que incorpora el uso de la traducción automática y la posedición en el Grado de Traducción y Mediación Interlingüística de la Universitat de València (España). **Marco teórico:** La tecnología y la traducción automática se conciben como herramientas al servicio del proceso traductor para la mejora de la competencia traductora del estudiantado. **Procedimiento:** Esta innovación curricular incluye el diseño y la implementación de una serie de actividades con las que se provee al alumnado de las herramientas, técnicas y procedimientos necesarios que exige el mercado de la traducción. **Discusión:** Los beneficios de esta innovación docente están ligados a una mejora de la futura inserción laboral del estudiantado. Asimismo, esta experiencia contribuye a sentar las bases para un diseño curricular innovador en el ámbito de la didáctica de la traducción.

Palabras clave: traducción automática; tecnología; innovación educativa; didáctica de la traducción; investigación cualitativa.

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Tradução automática e pós-edição para treinamento de tradutores e intérpretes

Resumo

Introdução: Este artigo apresenta os resultados da inovação em ensino realizada no âmbito do Projeto de Inovação em Ensino POSEDITrad, que incorpora o uso de tradução automática e pós-publicação no Curso de Tradução e Mediação Interlinguística da Universidade de Valencia (Espanha). **Quadro teórico:** A tecnologia e a tradução automática são concebidas como ferramentas ao serviço do processo de tradução para melhorar as habilidades de tradução do aluno. **Procedimento:** Essa inovação curricular inclui o desenho e a implementação de uma série de atividades que fornecem aos alunos as ferramentas, técnicas e procedimentos necessários exigidos pelo mercado de tradução. **Discussão:** Os benefícios dessa inovação no ensino estão ligados a uma melhoria na futura colocação profissional do aluno. Além disso, essa experiência contribui para lançar as bases de um desenho curricular inovador no campo do ensino de tradução.

Palavras-chave: tradução automática; tecnologia; inovação educacional; didática da tradução; pesquisa qualitativa.

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Introduction

The professional translation sector is undergoing profound changes that directly affect the teaching of this discipline at the university level. These changes are motivated by the rapid development of technology, mechanization, and the introduction of artificial intelligence processes in machine translation (MT) (Díaz, 2019). As we see with programs such as Google or DeepL, the result is an unstoppable advance of MT, especially the so-called neural machine translation (NMT) (Casacuberta & Peris, 2017), which has led translation companies to introduce it as an essential resource in professional contexts (Koponen, 2016). In this sense, the need also arises to incorporate MT in the translation classroom, so that future translators become familiar with this technology and understand under what circumstances they can use it, without reducing the quality of the final translated text.

This article presents the POSEDITrad[1], educational innovation project, which is being developed at the Translation and Interlinguistic Mediation Program at Universitat de Valencia (Spain) and emphasizes the use of technology as a key instrument in the training of future translators and interpreters. Specifically, it proposes the use of MT with free software tools, reflecting the reality of common professional practice and putting the translator at the center of the process when deciding about its use and suitability.

The innovation proposed in this project is based on the view that technology is part of the translation activity itself and serves to improve the translation process (Rico, 2017b). Far from the traditional conception that considers the use of technology as isolated content and as an end in itself, it is based on the premise that the teaching of translation cannot be carried out without the intensive use of technology, which is present in most of the translation process, hence it is an integral part of the translation activity itself and cross sections the different subjects of the teaching curriculum (Mellinger, 2017). Bearing this philosophy in mind, the aim is to provide students with MT techniques and tools, and to make them aware of the need to maintain control

1 This research is framed within the Teaching Innovation Project POSEDITrad (UV-SFPIE_PID19-1096107), funded by the Universitat de València (Spain).

to the highest degree possible over the translation processes of the assignments they will take part in involving MT. The final objective is to develop in the students a critical view of this technology and the different aspects that its use implies.

The current market for language services has to respond to the enormous volume of translations required by companies with international operations, with costs that are often unaffordable. The improvement in the quality of MT in recent years has made its adoption possible in the language industries (Bawa-Mason, 2018) and, thus, an activity has emerged adjacent to the translation process itself, the so-called post-editing (PE) (Translation Automation User Society [TAUS], 2012). This new task consists of correcting the machine-generated text so that it meets the required level of quality, and it can be applied to varying degrees depending on the final use to which the translated text is to be put. It is precisely this new flexibility with respect to the final quality of the translated text that gives MT the ability to adapt to different market requirements. In fact, a large number of computer-assisted translation (CAT) tools integrate neural MT programs and auxiliary post-editing tools (some examples are SDL Trados, Memsource, MateCat, or Wordfast). This technological progression has had an impact not only on the translator's daily work and professional activities, but also on his or her working conditions and social consideration, which have changed significantly. In the future, it is expected that these changes will continue and even accentuate, in pursuit of a constant improvement in productivity and with a consequent impact on the rates for translation assignments (Vieira, 2020). This issue opens up an important debate in Translation Studies since, as we shall see below, it directly affects how translation competence is defined and put into practice in university education.

As can be seen, automation as another process in the workflow of companies in the translation industry is a reality, and its presence in the market is wide (De Palma et al., 2016; Koponen, 2016; Way, 2018). In fact, the latest report on the international machine translation market published by the Translation Automation User Society (TAUS, 2017a) explicitly states that this technology is used to translate large volumes of text such as SMS, emails, instant messaging, user forums, user reviews, wikis, and blogs without the need for a translator. This same report points out that PE is not a new phenomenon, but has nowadays become a common practice in the professional translation field (TAUS, 2017a), as it offers an improvement in productivity over human translation (Aranberri et al., 2014) while not negatively affecting translation quality (Plitt & Masselot, 2010) and allowing large amounts of texts to be translated with a combination of MT and PE in which the human factor is present to ensure the necessary level of quality (Leiva, 2018).

Teaching Technology in Translator's Training

The new landscape presented by the translation industry and the prominence of technological resources used in the translation process have led to a growing debate among academics and translation experts regarding the introduction of technology in the classroom, its orientation, and its application (Doherty & Kenny, 2014; Mellinger, 2017; Plaza, 2019; Rico, 2017a; Rodríguez-Inés, 2013; Wang, 2013). Almost all universities in the world have been incorporating technology into their curricula from different perspectives and contexts with the use of specific technological resources (Man et al., 2019). Nevertheless, there is a need to reconsider the suitability and nature of the technological resources included in the different curricula, mainly due to the lack of alignment between the skills developed during student training and the real market demands. According to TAUS (2017b), the gap between university and industry is so great that recent graduates in translation immediately perceive that they do not fully know how to do the work they are assigned and that the basic skills they have acquired are not sufficient.

The introduction of technology in the translation classroom leads us to address the question of competencies in translators and interpreters training. The skills that every translator must possess in order to perform his or her job are known as translation competence. This includes a series of skills, knowledge, and attitudes that, when used together in professional translation, serve to distinguish a professional

and expert translator from a non-professional and non-expert one. This competence is broken down into a series of sub-competencies or levels. PACTE (2018) and Hurtado et al., (2019) describe these levels of competences and written translation performance through the following categories:

- linguistic competence
- cultural, encyclopedic, and thematic competence
- instrumental competence
- competence in the provision of translation services
- problem-solving competence

Traditionally, translation technologies have found a place as an instrumental sub-competence. However, the multi-competency models that have dominated the translation teaching landscape do not seem to respond to the paradigm shift implied by the introduction of new technological resources in professional practice (Rozmyslowicz, 2014). In this regard, Austermühl (2013) suggests two meta-competencies: the ability to revise texts in the target language and the ability for documentation. Other minimalist proposals are based on the acquisition of basic technological skills (Pym, 2013). In the specific case of post-editing, the main competencies associated with this task refer to three fundamental areas: linguistic competencies (encompassing communicative, textual, and cultural issues), instrumental competencies on the use of technology, and specific competencies related to the task of proofreading machine-translated texts. The latter refer, on the one hand, to the capacity to apply post-editing rules and accommodate the translated text to the quality expectations required by the client and, on the other hand, to the strategic capacity that allows the post-editor to choose the most appropriate option for each possible alternative when post-editing a specific segment (Rico & Torrejón, 2012).

In Europe, the new competency framework of the European Master's in Translation (EMT, 2017) defines five competence areas (language and culture, translation, technology, personal and interpersonal, and service provision). The specific area of technology competencies states that students should not only be able to use the most important software applications, search engines, corpus-based tools, text-analysis tools, and CAT tools; it also states that they need to master the basic operation of MT and assess its impact on the translation process and its importance in the workflow. Thus, when it comes to incorporating MT in the classroom, there is the dichotomy of applying a transversal integration of technology in various elements of the curriculum or incorporating it in a traditional way through specific subjects created specifically for this purpose, which currently seem to be insufficient to properly prepare students in light of the demands of the translation market. This is because:

> Language professionals are involved in various stages of MT implementation such as terminology management, content pre-editing (which involves a process that is performed on source language text prior to translation with MT systems) and post-editing, and advice on changes to MT service providers (Mellinger, 2017, p. 290).

In the case of MT, transversal integration can be implemented in the technology subjects themselves, in general subjects, or in those where translation practice prevails. It can even be integrated into independent study or work activities. In this way, with transversal incorporation, students can become more familiar with this technology and will use it more often in their translation exercises.

Regarding the methodologies used, it is worth highlighting learner-centered approaches. Translator training, which traditionally focused on learning to translate by translating, has evolved towards other approaches that simulate professional practice to develop translators' skills. Consequently, several authors advocate the simulation of real projects from a situational context (González-Davies & Enríquez-Raído, 2016; Killman, 2018; Mellinger, 2018). Other authors have suggested the use of the portfolio (Calvo, 2017; Rico, 2017b), which in turn serves as a tool for student empowerment (Kiraly, 2012). Samson (2013) agrees that the acquisition of general technology skills is necessarily associated with the use of appropriate computer tools to develop projects and solve problems in professional situations. In general,

there seems to be a consensus among scholars that translation programs and curricula must adjust to market needs by incorporating MT in a wide range of situations (Gaspari et al., 2015) that must inevitably include the new role of the translator as an MT post-editor (Rico & Torrejón, 2012).

Characteristics of the POSEDITrad Teaching Experience

Within this framework, the POSEDITrad project was planned with the aim of making university translation students at Universitat de Valencia aware of the need to maintain the highest possible degree of control over the translation processes of the assignments in which they will be involved, and in which MT and PE are present. In this regard, a series of activities were designed with the following objectives:

- To provide students with computer techniques and tools for professional translation, such as MT and PE.
- To use technology as a tool to show that MT is an essentially collaborative activity, in which multiple resources and documentary sources are used, and in whose process several translators may be involved, and not an individual activity focused on the text.
- To work on the aspect of communication and negotiation with the client to convey the importance of the human element in MT, either by post-editing the texts or by performing other key activities, such as checking the terminological consistency of the text or establishing the quality level of the final text.
- To practice post-editing within an integrated translation environment involving MT and CAT tools as much as possible.

In addition to the acquisition of instrumental skills, the teaching experience also sought to foster a critical spirit in the use of technology among students, according to the following premises:

- To reflect on and encourage debate about the concerns generated by the use of MT and its professional aspects, such as the confidentiality of the texts uploaded to an MT server or the appropriate rates for these translations.
- To develop in the students a critical view of the data used to strengthen the system in order to determine its degree of reliability.
- To develop in the students a realistic perception of the effort put into post-editing and the emotional dimension that accompanies this activity.
- To objectively and flexibly evaluate the quality of the machine-translated text according to the requirements agreed with the client.

The teaching experience from the POSEDITrad project was implemented in four subjects of the Translation and Interlinguistic Mediation Program of the School of Philology, Translation, and Communication of the Universitat de Valencia (Spain). This program provides compulsory multilingual training and, as far as technology is concerned, has several subjects that have a direct impact on the technological sub-competence of the students, being these three specific subjects. First of all, *Translation Technologies* is a subject that provides training in basic computer operations, operating systems, internet tools, and editing techniques to an advanced level. An introduction to CAT tools is included, as well as corpus collection and analysis, resource creation and management, as well as technical terminology and other translation tools. The curriculum also includes two other complementary subjects closely related to technology, such as Documentation for Translators and *Terminology and Lexicography*. Likewise, the technological sub-competence is present in the Specialized Translation subjects, in its various forms (audiovisual, legal, scientific-technical, and economic), as well as in the interpreting subjects (oral translation).

The subjects selected for the teaching experience were scheduled for the first and fourth years of the program. They are subjects of a very different nature, ranging from specialized translation, for example, of scientific and economic translation texts (*Specialized Translation 2*), and literary and audiovisual texts (*Specialized Translation 3*) to general translation (*Reverse Translation [Spanish-English]*, *General Translation 1 [English-Spanish]*. A total of 70

students enrolled in the program participated in the teaching innovation during the 2019-2020 academic year. Three of the subjects implemented the innovation activities during the first term of the course and one of them, in the second. The teaching was carried out by five professors in the project, all of them specialists in translation didactics and with extensive teaching experience.

Typology of Teaching Activities

In order to ensure that the innovation did not interfere with the process of acquiring basic skills and the fundamental techniques of human translation in translation subjects, the design of the teaching activities was divided into two groups, depending on the time at which they were to be carried out. Thus, for the first year, the activities were oriented towards the identification, analysis, comparison, and reflection on the available MT tools and their most basic use. On the other hand, in those fourth-year subjects such as Specialized Translation 2 and 3, and Reverse Translation, the student has a greater maturity and criteria to work with MT and PE practices, to assimilate them, and to be able to evaluate them within the framework of the assignment and the translation process itself, through exercises and activities that simulated the usual practice of the profession in an integrated environment of translation tools.

The following is a summary of the main activities carried out in the classroom:

- Practices with different MT programs
- Post-editing practices.
- Evaluation of MT (automatic or manual)
- Reflection and discussion on professional issues: confidentiality, market, ethical aspects, and pricing policies.

For illustrative purposes, some concrete examples of the classroom are shown in Figures 1 and 2.

It should be noted that free and open-source software has been used for all activities. Our choice is based on the studies showing that professional translators use free online translation systems to a greater or lesser extent. Secondly, their open and transparent nature allows students to easily take control of the tools (Diaz, 2011). The selected MT and PE tools include rule-based MT engines, statistical methods, and neural networks such as *Apertium*[2], *Systran*[3], *DeepL*[4], *Google*[5], *Translate2018*[6], They are fully recognized, tested, and commonly used by professional translators and PE specialists. On the other hand, the activities have been conceived so that students develop an adequate perception of the effectiveness of MT as a tool at their service during the translation process, not as an end in itself. Likewise, the aim is to encourage a critical attitude toward the role that technologies play in the professional practice of translation and the advantages and disadvantages that MT could entail, so that students are aware of the impact technologies will have on their professional sphere in the future. The final objective is for students to consider MT as a challenge and as an opportunity at the same time, not as a threat. With all this, it is intended that students receive professionalized learning that will allow them greater employability.

Method

In order to assess the teaching innovation carried out, *Grounded Theory* was used as a basis, following the postulates of Birks & Mills (2015) to perform a qualitative analysis of content. This type of qualitative research has been widely used in various fields of knowledge in Higher Education (Den Outer et al., 2013; Lichtman, 2013), as well as in Applied Linguistics. This theory allows to better understand how students interpret their reality and to get an insight into teaching and educational problems (Hadley, 2017). In this context, the method allows the application of systematic and, at the same time, flexible guidelines to collect qualitative data and thus build theories "grounded" on the data themselves using the inductive approach (Charmaz, 2006). According to the principles of Grounded Theory, it is necessary to identify theoretical categories derived from the data by using a constant

2 https://apertium.org/index.spa.html?dir=arg-cat#translation
3 https://translate.systran.net/translationTools/text
4 https://www.deepl.com/translator
5 https://translate.google.es/?hl=es
6 https://www.translate2018.eu/#/text

Figure 1. *Activity Proposed in the Subject Specialized Translation 2*

Specialized Translation 2 (English - Spanish/Catalan).
Creation of a translation project integrating machine translation and post-editing

In this activity you will translate in an integrated translation environment that contains a machine translation and post-editing module. We will use the free access tool Matecat https://www.matecat. com/. Here are the steps to follow:

1. Create a Translation Project and upload the economic-financial report for translation.
2. Load to Matecat the file "Economic report for translation" and analyze it.
3. Deliver the file with the analysis.
4. Proofread the translation and add comments.
5. Consult the "Edit Log" and download the CSV file with the report. Submit this file.
6. Download the finished translation and submit it to your Virtual Classroom.

Note: Own elaboration

Figure 2. *Activity Proposed in the Subject General Translation*

General Translation 1 (English - Spanish/Catalan). Translation Systems Analysis

Translate the following fragment of a tourism text with the different programs listed below, describe its main features, and compare the resulting translations.

Apertium https://www.apertium.org/index.spa.html?dir=eng-cat#translation
Systran https://translate.systran.net/
DeepL https://www.deepl.com/translator
Google https://translate.google.com /

As a group, share the results of the table and then answer the following questions:

1. Which program do you think translates best? Why? What cannot the machine translate well? What kind of errors are they?
2. Do you think that machine translation can be used as an alternative to human translation in the professional field? Justify your answer.
3. Do you think it is worthwhile for the translator to proofread after machine translation to ensure the necessary quality? Justify your answer.

Submit the file for this activity to your Virtual Classroom.

Note: Own elaboration

comparative method. In this context, data analysis ("coding" in Grounded Theory terms) involves, in turn, three levels of observation: (a) open coding, (b) axial coding, and (c) selective coding, with the aim of completing the picture of the information obtained during the data collection process (Corbin & Strauss, 2008).

Instrument

To carry out the study, an initial questionnaire and a final questionnaire were designed using the Google Forms application. The questionnaires, which were anonymous, included open-ended, free-response questions in which the student could reflect his or her perceptions about the teaching experience. Self-administered questionnaires were used, since this format allowed a large amount of information to be gathered and gave students more time to complete the survey. This type of instrument was useful for the respondents to explore the importance of each question, even if it required more effort on their part, since they had to write at length. The questions were designed with the express purpose of eliciting responses about the students' opinions on the introduction of MT in the classroom and the evaluation of the teaching activities implemented[7].

Participants

Prior to the socialization of the case, informed consent was obtained for the use of the data for teaching and research purposes. The students responded without the help of an interviewer, so as not to introduce any bias in the questions asked. A total of 68 students of General Translation 1 (English-Spanish/Catalan), Reverse Translation (Spanish/Catalan-English), Specialized Translation 2 (English-Spanish/Catalan), and General Translation 3 (English-Spanish/Catalan) participated in the initial questionnaire and 53 in the final questionnaire (24 students of Specialized Translation 2, 7 of General Translation 1, 9 of Specialized Translation 3, and 14 of Reverse Translation).

Data Analysis

The data obtained from the responses to the questionnaires were analyzed manually by the two researchers who signed the study in accordance with the fundamental premises of Grounded Theory, as referred to above. For this purpose, a constant analysis was carried out as a process of systematic comparison between the data obtained, with the purpose of discovering categories and their properties and levels of codification in three phases up to the conceptualization and explanation of the relationships between the categories at a higher level of abstraction.

The initial step was to read and reread the questionnaires to get a general understanding of what the participants were reporting. At this point, we began to get a sense of the main points expressed by the participants. Coding began with an initial open coding of relevant parts of the text to capture data related to the research question. During this first phase of the coding process, data were compared by examining parts or all of the data systematically to establish categories.

Secondly, axial coding was established, in which the relationships between categories were determined: the data were classified after open coding that allowed connections between categories in order to form more precise and complete explanations.

A third step, selective coding, consisted of reducing the codes to themes by searching for common elements in the codes and producing a discursive set of theoretical propositions by connecting the categories, thus constructing a set of research results. This thematic analysis based on the content provided by the respondents not only allowed the examination of possible links between concepts to draw inferences, but also the identification of their suitability in relation to the research objectives. The resulting themes are presented in the following section.

Results

Three main thematic categories were obtained from the content analysis, namely:

- the actual use of MT by students

7 The questions from the two questionnaires can be found in the appendix.

- the benefits and detriments that they believe this entails
- professional issues related to MT

The vast majority of the learners stated that they had no prior training in MT and PE. However, they admitted that they had relied on MT as users to learn a new language or to understand the general meaning of a text in a language they did not know. A large majority also acknowledged that they had used MT to a greater or lesser extent to carry out the exercises that were assigned to them for human translation in the different subjects, followed by the corresponding post-editing.

This fact illustrates that the students, despite not having received prior training in MT and PE, had already adopted the use of these tools and had voluntarily and spontaneously carried out post-editing.

There is also a consensus among students that MT is not valid for translating all types of texts ("I think that machine translation works better with texts with specialized terminology") and they insist on the need for texts to be homogeneous, to present predetermined elements, and to contain a simple syntax ("since they are specialized texts, they are repetitive and, therefore, MT helps you translate faster.")

Another aspect that should be highlighted is that the students point out a series of benefits that the use of MT can bring them ("with MT you can save time, increase productivity, streamline work"; "it can be a very useful tool for certain assignments if you know how to use it correctly,") as well as another series of advantages ("to quickly understand the general meaning of a text, look up a specific word, translate sentences containing complicated syntax, etc.") MT is also conceived as a possible tool for evaluating one's own human translation ("it helps me compare and see if I have translated well.") However, the students are also aware of the limitations and risks involved in the use of MT, especially at the professional level. This concern is reflected in situations involving the confidential use of data ("in the classroom, the use of MT is not a problem because we do not usually work with confidential texts, but in the labor market, I see it as an important issue to take into account,") as well as the final rates for the translation. In this case, it is interesting to note that there is some confusion between the meaning of post-editing and the type of partial or total matches obtained in a translation memory, as one of the answers shows: "if your client expressly asks you for post-editing, he may not pay you for total matches, but only for the words translated with human translation." Finally, other ethical issues are mentioned ("very poorly edited texts can be delivered at the price of human translation.")

In general, the students reported great satisfaction with the innovation. In particular, the students considered that the machine translation activities they performed in the subject were clearly designed, with simple instructions and sufficient resources and materials to complete each activity. Similarly, they indicated that the explanations given for the different activities were sufficient.

Discussion

Translation has become a profession characterized by the continuous pressure caused by automation, the generalized drop in rates, and the high competitiveness in the sector. Translation technologies play a fundamental role in the translation process, which is why it is necessary to consider their introduction in translator's training in higher education from a transversal perspective and in line with the demands of the translation market. The POSEDITrad project opted for the incorporation of technology from this perspective, applying MT and PE to develop the technological competence of students in the different translation activities and simulating future professional translation practice. It is expected that, by the end of the teaching innovation, students will be able to position themselves in the market with a more complete professional profile and will be able to successfully handle assignments that include the use of MT and PE software as indispensable tools to reduce costs and to speed up the work. The connection with the labor market is certainly straightforward since students will have some basic prior knowledge and will already have done MT and PE practice with the most common

tools when they have to deal with them in a real professional setting. The situation of the translation sector has also been brought closer to the classroom, and students have been made aware of the paradigm shift and the repercussions of the unstoppable advance of technology and MT in the daily work of translators.

One of the difficulties encountered in the implementation of this project in the classroom is the dynamic technological environment, with practices being relegated by new and updated tools and technologies, which is why it is vital to design cutting edge curricula that can be periodically reviewed and updated. Another major constraint is the various challenges faced by translation trainers, who must help students acquire solid technological skills that meet both the needs of today's language service industry and the new realities of higher education. However, all indications are that, in the Spanish context, MT is making its way through innovative teaching practices or projects that are integrated into a wide variety of subjects.

The results obtained from the qualitative content analysis based on Grounded Theory point to three main topics: students' habitual use of MT, the benefits and detriments of using MT, and the concern about the repercussions of using MT in a professional setting. Given that this exploratory study was carried out on a small scale and in a specific context, we believe that in the future it will be necessary to delve further into these issues through research of a larger dimension and scope. All in all, the project presented here is a necessary first step in the design and incorporation of MT and PE activities in the translation classroom that can serve as a basis for the development of larger innovation projects for technology innovation in the future. Likewise, this teaching innovation experience can contribute to establish a theoretical basis for an innovative curriculum design that includes MT as a tool at the service of the translation process in the light of practical theoretical references. In this sense, as pointed out by Cid-Leal et al. (2019), the presence of MT in professional statements is already a fact and, therefore, a systematic approach is necessary not only in the definition of the teaching content in this field but also in the exploration of which competencies are relevant and how they can be developed in the most effective way. Thus, for translator's training at the undergraduate level, Sánchez-Gijón (2016) proposes abandoning the homogeneous conception of PE, which is normally presented theoretically, and approach this modality from three dimensions. The first dimension studies how PE is carried out; the second dimension deals with the moment for post-editing, that is, at what point in the publication cycle it is carried out; the third dimension is related to the profile of the post-editor; and the last dimension takes into account the objective of PE.

With respect to postgraduate education, authors such as Guerberof & Moorkens (2019) indicate that while curriculum designs should include MT, they should not neglect the development of the more creative aspects of translation that differentiate humans from machines. It is a matter of emphasizing the creative aspects of training, with project-centered activities that help students think innovatively rather than following a set of instructions given to perform a set of tasks predetermined by technology. Additionally, Plaza (2019), in his review of the curricula of the MA programs that make up the European Master's in Translation (EMT, 2017) network, points out that MT training should be understood as a central part of the translation process and allow students to specialize in different areas that must necessarily go hand in hand with this technology.

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Appendix A:

Pre-questionnaire

1. What subject in the program are you taking?
2. From this list, indicate the subjects you have enrolled in (you can choose several)
3. What technological tools do you know to assist translation?
4. Of the tools you know, which ones do you use and what for?
5. What do you understand by machine translation?
6. What do you understand by post-editing?
7. Have you received previous training in machine translation and post-editing during your studies?
8. Do you use or have you used machine translation for your classroom translations?
9. What other uses do you have for machine translation?
10. Do you have previous professional experience using machine translation?
11. How do you think machine translation will affect the translation profession?
12. Do you think that your current knowledge of technology is enough to perform well in the labor market? Why?

Appendix B:

Cuestionario posterior

1. In which class are you filling in this questionnaire? Choose an option
2. What do you think you have learned about machine translation in this course?
3. Do you think machine translation can help you translate better in this subject? In what aspects?
4. Do you think machine translation helps you to translate a specialized text? (Question for 4th year students only) Why?
5. Do you consider that machine translation helps you when looking for information to document yourself in this subject? Why?
6. When we have shared in class about the different translation proposals, what do you think that everything we have seen about MT has contributed to this discussion? Is there any specific problem that MT has helped you solve? Give some examples.
7. What types of texts would you use machine translation for in this subject?
8. Do you think the machine translation activities you completed were clearly designed, with simple instruc tions and sufficient resources/materials to complete each activity? If there is anything you missed, please point it out.
9. Have the explanations you have received in this subject for the assignments been sufficient?
10. Have you been able to solve all the doubts you have had while doing the machine translation activities in this course?
11. What other activities would you have liked to do but did not do in this course?
12. Do you think that the use of machine translation can affect the final price paid for a translation? Briefly justify your answer.
13. Do you think the use of machine translation has any bearing on the confidential use of data?
14. Are there any ethical issues of relevance related to the use of machine translation? In the classroom? In the labor market? Briefly justify your answer.
15. When do you think machine translation should be introduced in translator's training? Why?
16. Do you think it is necessary to know how to perform human translation well before learning how to use machine translation? Justify your answer.
17. Do you think you should continue your training in machine translation? Justify your answer.