

Translation and post-editing performance of translation students – a cross-sectional analysis

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Abstract

This study presents partial results of a comprehensive study to reveal what role PACTE's translation sub-competences play in human translation and in the post-editing of machine translated texts. In the PACTE model, both language competence and background knowledge related to the source text are given a prominent role. The present research explores how these factors are associated with MA students' translation performance. 20 first-year and 27 second-year master's students of translation (University of Szeged, Hungary) translated or post-edited the abstract of a study on bilingualism from English to Hungarian and completed a test measuring their relevant thematic knowledge and language tests assessing their source language competence. Our analysis focuses on comparing the quality of translated and post-edited texts, and on the time needed to complete the target text. The correlations between test scores, on the one hand, and error types and error numbers in the translated and post-edited Hungarian target language texts, on the other hand, are also examined. Our results indicate that both at the beginning and at the end of the training, post-editing was faster than human translation and post-edited texts contained fewer errors than human translations. In the second-year sample, thematic knowledge and time on task showed significant correlations with performance indices.

Keywords: human translation, post-editing, translation competence, background knowledge, source language competence

Introduction

With the advent of modern technologies in the language mediation industry, post-editing of machine translation (MT) output has become an industry norm (Domingo et al. 2020). The overall aim of the comprehensive investigation of the Translation Competence Research Group at the University of Szeged, Hungary, is to reveal what role PACTE's translation sub-competences play in human translation (HT) and the post-editing of MT. The research presented here examines the role of source language (SL)

competence (in this case English) and background knowledge related to the topic of the SL text play in the quality of HT and post-editing of MT.

First, a literature review is provided, focusing on translation competence, background knowledge and SL sub-competences, and on the comparison of post-editing and human translation.

Next, the Szeged Translation Competence Research Project is described, and the methodology of the present investigation is detailed, followed by the presentation and discussion of the results and a summary.

1 Literature review

1.1 Translation competence

Mapping and understanding translation competence is a vibrant research field in Translation Studies; competence models range from minimalist definitions (Pym 2003) to elaborate multicomponent models. Some of these multicomponent models focus on professional translators, such as TransCert (Krajcso 2018) or the PACTE Model, while others tend to focus on translator training, for example, the EMT model (EMT 2022). In spite of the differences in focus, these models share several common components.

In our investigation, we use the translation competence model of the PACTE Group (PACTE 2003, 2008, 2014; Hurtado Albir 2017) and their definition of translation competence. The PACTE group defines translation competence as ‘the underlying system of knowledge, abilities and attitudes required to be able to translate’ (Hurtado Albir 2017, 320). Translation competence has both declarative and procedural knowledge components and is made up of five sub-competences, and extra psycho-physiological components (PACTE 2008, 2017a). The following sub-competences are considered parts of translation competence: 1) bilingual sub-competence, 2) extra-linguistic sub-competence, 3) knowledge about translation, 4) instrumental sub-competence and 5) strategic sub-competence. Additional psycho-physiological components are made up of cognitive components, attitudinal aspects, and abilities. Cognitive components comprise memory, perception, and attention; attitudinal aspects include, among others, intellectual curiosity, perseverance, motivation, and the ability to assess one’s own skills; while abilities listed are creativity and logical reasoning (PACTE 2008, 106, PACTE 2017a, 39-40).

In addition to PACTE’s Translation Competence project, the research group also carried out the Acquisition of Translation Competence (ATC) project. PACTE conceives the acquisition of translation competence as a dynamic, spiral process, leading from novice knowledge or pre-translation competence to expert knowledge or translation competence (PACTE 2014, 92-93, PACTE 2017b, 303-305). In the course of this process,

translator trainees integrate, develop, and restructure both procedural and declarative knowledge. Translation sub-competences are thought to develop in an inter-related fashion, sometimes compensating for each other.

By today, post-editing has become a norm in the translation industry (Domingo et al. 2020), however, competences related to post-editing have not been incorporated into translation competence models, although the EMT model (2022) does mention post-editing under “Translation” the sub-competence. At the same time, competence models related to post-editing do exist, for example the post-editing competence model of Nitzke, Hansen-Schirra, and Canfora (2019). The model includes the four core competences of risk-assessment competence, strategic competence, consulting competence, and service competence. These are complemented by eight subsidiary sub-competences, which are bilingual and extralinguistic competence, instrumental competence, research competence, revision competence, translation competence, machine translation competence, and post-editing competence (Nitzke et al. 2019, 248-250).

Their revised PE competences model (Nitzke and Hansen-Schirra 2021) places more emphasis on errors and error handling. In addition to a basic translators’ skill set, error handling, MT engineering and consulting competences are included in the model. Error handling is highlighted for several reasons: post-editors have to be familiar with the differences between the error-types different MT systems produce, and, in addition, they have to be able to spot and correct these errors (Nitzke, Hansen-Schirra 2021).

1.2 Background knowledge and source language competences

All of the multicomponent models of translation competence include a background knowledge or domain competence element (Krajcso 2018), referred to as *Thematic* competence in the EMT reference framework, *Domain-specific skills* in the TransCert skill card, domain competence in the ISO 17100:2015, and *extra-linguistic sub-competence* in the PACTE model. Some authors argue for the importance of general knowledge in translator training as a basic problem solving tool (Collombat 2006), while others argue for the importance of specific background information related to the translation task (Kim 2006).

However, there is a lack of empirical investigations that try to find relations between background knowledge in a specific field and translation/post-editing performance in that particular field.

Similarly, language competence-related empirical investigations are scarce in the field of Translation Studies. Although trainers and practitioners agree on the outstanding role of language competence in translation, few studies offer empirical evidence for it. Only some authors have dealt with the problems of L1, L2, or L3 language skills among students of translation (e.g., Neubert 2000, Pym 1992).

Using a style-based grammaticality judgement task, Ureel and his colleagues (2021) have mapped the development of the L2 sociolinguistic competence of translation trainees. The results highlight the need to develop students' sensitivity to grammatical (in)formality in translation training.

Do Carmo and Moorkens (2020) report in their study on post-editing that post-editors spend most of the time on pauses and not on keyboard actions, which, in their view, might show that PE is more closely linked to reading than to writing. They also add that PE might require more complex reading skills than translation from scratch.

1.3 Post-editing and human translation – productivity, quality and error types

As post-editing has become an industry norm (Domingo et al. 2020), research interest in PE has soared. Empirical research in the field primarily focuses on the topics of

- (a) the productivity of post-editing, operationalized as the amount of time needed to produce the final version of the target text (TT);
- (b) the quality of the post-edited text, often compared to the quality of human translations;
- (c) errors specific to, or more characteristic of, post-edited texts.

Productivity is a key issue in MT and PE; one of the reasons for their development and implementation is to save money or effort with their use. Numerous studies have been published on the three aspects of post-editing efforts, which were originally defined by Krings (2001): temporal effort, cognitive effort and technical effort.

The temporal effort in PE is usually mapped using keylogging or screen recording; the output measures are translated words per hour or the total amount of time needed to translate a specific text. The results of studies on the time needed for post-editing tend to support its temporal efficiency (e.g., Plitt and Masselot, 2010; Aranberri et al. 2014, Carl et al. 2015; Daems et al. 2017), however, other studies failed to find differences in the speed of PE and HT (García 2010, Carl et al. 2011), and many highlighted that some variables of the translation setting had an outstanding impact on PE time.

Many studies investigating the *quality* of post-edited texts have not found any difference between PE and HT (García 2010, Daems et al. 2017, Jia et al. 2019, Screen 2019). Contrary to publicly held beliefs about the poorer quality of post-edited TL texts, Fiederer and O'Brien (2009) found that post-edited translations scored slightly higher on clarity and accuracy than from-scratch translations, while from scratch translations were rated higher on style. Another study found that post-edited texts contained fewer errors than HT (Plitt and Masselot 2010). These results lead us to conclude that post-editing and human translation seem to produce target texts of comparable quality. It

has to be noted, though, that the studies surveyed had small sample sizes, leading to statistically not significant differences.

One way to express the quality of translations and post-edited texts is through error numbers and error types. Lately there has been a growing interest among researchers to describe the characteristics of post-edited texts and to identify error types that are more common in PE than in HT. Studies that have revealed such differences include Čulo and Nitzke (2016), who found that HT texts were characterized by more accurate terminology use than PE texts; Carl and Schaeffer (2017), who suggested that PE might lead to more literal translations than HT; and Bangalore et al. (2015), who reported that sentences in PE show less syntactic variation than in HT. Finally, Toral (2019) has shown that PEs are characterized by simplification, normalization and interference. Others, for example Daems et al. (2017), reported no evidence of post-editedness in their study.

Most of the above results are connected to Statistical Machine Translation (SMT); however, there has been a fundamental change in MT and the post-editing of machine translation with the appearance of neural machine translation (NMT). NMT produces more fluent target language texts, which, however, do not always accurately convey the meaning of the SL text correctly (Guerberof Arenas, Moorkens 2019; Martindale, Carpaut 2018). This has serious consequences for the productivity of post-editing, the quality of post edited texts, errors in post-edited texts and translators' attitudes toward MT and PE. NMT errors are reported to be more similar to human errors, whereas SMT errors have a complementary nature compared to both NMT and human errors (Yamada 2019). As a result of the similarity between human and NMT errors, post-editors are less likely to find errors in NMT outputs.

1.4 The Szeged Translation Competence research project – aims and objectives

The data analyzed in this paper form part of the Szeged Translation Competence Research Group's comprehensive research project. The aim of the project is to investigate what role the elements of translation competence (PACTE) play in human translation (HT) and in the post-editing of machine translation (PE). The following variables are included and operationalized in the project: source language skills, thematic knowledge, declarative knowledge of translation, source language text type, translation experience, work mode (HT or PE), and students' perceptions of the advantages and disadvantages of working with HT or PE.

The project focused on MA students of translation and interpreting at the University of Szeged. At the beginning of their MA studies, students completed a language test, based on Cambridge Proficiency tests, to assess their English (B or C) language knowledge. The language test was made up of two parts. The students had to fill in a Reading test,

with two multiple-choice tasks and one test with missing paragraphs. The Use of English test included two gap-filling exercises and one sentence transformation task. In addition to the language test, the students also filled in a test on their beliefs about translation.

The tests were administered using Google Forms.

Also, at the beginning of their studies, students translated or post-edited a test on bilingualism (language direction: English to Hungarian), and filled in a domain-specific background knowledge test related to bilingualism to assess their extra-linguistic knowledge. It was a 10-item multiple choice test on bilingualism.

At the end of their studies, one group of MA students translated or post-edited a legal text from English into Hungarian and filled in a domain-specific background knowledge test to assess their extra-linguistic knowledge. It was a 10-item multiple choice test on copyright law.

Another group of the second-year MA students translated or post-edited the same text on bilingualism as they did at the beginning of their studies.

The background knowledge questionnaires were filled out online (Google Forms) within a given time frame (about 3 weeks before or after the time the translations were made).

Video recordings and key-log files were also made of the HT/PE protocols.

This research design has yielded a wealth of data, part of which is analysed and presented in this paper.

1.5 Research questions

In the present paper, we use data to answer the following research questions:

Is there a difference between the efficiency of translation and post-editing

- in 1st year translation MA students (at the beginning of their studies)?
- in 2nd year translation MA students (at the end of their studies)?

Is there a difference between 1st and 2nd year students' performance?

Do hypothesized background factors (language competence, subject competence, time to translate) show a relation to performance?

Efficiency in our study is conceptualized as temporal efficiency, that is, time taken to prepare the target text. Performance is operationalized as target text quality, which is expressed in error numbers.

2 Methodology

2.1 Participants and materials

20 first-year students (at the beginning of their studies – September 2020) and 27 second-year master’s students of translation (at the end of their studies – May 2022 and May 2023) formed the sample of the present investigation (see Table 1). The study had a cross-sectional design, although 6 students were involved in the data collection both as first- and as second-year students. It is important to stress here that at the University of Szeged, in Hungary, translator training takes place on master’s level exclusively, within the framework of a four-semester translator and interpreter training program. This means that 1st year master students can be seen as highly proficient language learners or language users, who have no experience in translation at all. Another important background information is that students’ training did not involve any explicit training in post-editing at the time of the data collection.

Table 1. *The sample of the present study*

	Human translator	Post-editor
1st year students	11	9
2nd year students	11	16

Translation and post-editing performance were assessed by a translation/post-editing task, in which the source text was a 127-word long English abstract on bilingualism, and the target language was Hungarian. English was the B or C language of the translator trainees, and Hungarian was their A language. As most students had a BA degree in modern philology and had courses in linguistics, they were familiar both with the topic (bilingualism) and the genre (abstract).

Students also completed a test measuring their relevant linguistic background knowledge, together with a language test, which was based on the Cambridge Proficiency Tests assessing their source language (English) competence. There was a three-section Reading test, with two multiple-choice sections and one test with missing paragraphs. The Use of English test included two gap-filling exercises and one sentence transformation task.

The domain-specific background knowledge of the students (extra-linguistic knowledge) was measured using a 10-item multiple-choice test on bilingualism.

The tests were administered using Google Forms.

2.2 The data collection procedure

Data collection took place in autumn 2020 and in spring 2022 and 2023. All the translations were prepared in a classroom setting, and there was a time limit of 120 minutes for the task, but that limit was never actually reached. Students had internet access and were allowed to use whatever sources and webpages they wanted to use. Nevertheless, students in the HT condition were instructed to refrain from MT. The MT output for the post-editors was produced by DeepL. At the time of the data collection DeepL already used NMT. Students were asked to produce a target text of publishable quality (i.e., full post-editing of the MT output), without using TM software. Students worked in Translog, as data was collected on the translation/post-editing process, too. In addition, OBS Studio was used to record the computer screen while students were working on the translation/post-editing task.

To establish time on task, video recordings were used. The length of the translation/post-editing process was counted from the moment the ‘start logging’ button was pushed in Translog until the ‘stop logging’ button was pushed.

Students filled in the Google Forms tests online within a given timeframe (about 3 weeks before or after the time the translations were made).

2.3 Methods of data analysis

The quality of the target texts was evaluated by two raters (the researchers) with the help of MQM-based error categories. Multidimensional Quality Metrics (MQM, <https://themqm.org/introduction-to-tqe/>) is a translation evaluation system that can be applied to both human and machine translation. A major advantage of MQM is its flexibility. The typology contains seven high-level dimensions with further error sub-categories (e.g., dimension = Accuracy, one of its subtypes = mistranslation). The actual error categories can be adjusted to the needs of the actual user. MQM is widely used in the language industry and in translation research.

The categories used in this study were accuracy, fluency, style, and terminology. In addition, total error scores were also calculated. After checking inter-rater reliability, the mean values of the 2 raters’ error numbers were calculated for each error category, and these mean values were used in all further analysis.

In addition to error numbers, language test scores and bilingualism test scores (i.e., thematic/subject knowledge scores) were included in the analysis together with data on the time taken to prepare the translation. Statistical analyses were carried out with SPSS v. 24. Statistical analyses involved comparing human translators’ and post-editors’ performance, comparing students at the beginning and at the end of their studies, and testing correlations between test results and the number of errors in the target language text.

3 Results

3.1 Differences between post-editors and human translators

Independent samples t-tests were carried out to check whether there were significant differences between the efficiency of translators and post-editors. First-year and second-year students were handled as different sub-samples and thus, t-tests were performed for each group separately.

In the first-year sample (n = 19) no significant differences were found in the time taken to produce the target texts (human translators: M = 53.6 min., SD = 15.5; post-editor: M = 52.2 min, SD = 10.25, $t(17) = 0.22$, $p = .83$). As for the quality of the translations, no significant differences were found in most factors. However, differences in error numbers were significant in Style (human: 7.95 – post-editor: 6.12) and marginally significant in the Total number of errors (human = 25.04 – post-editor = 21.31). As can be seen in Table 2, it was the post-editors who made fewer errors.

Table 2. *Significant differences between human translator and post-editor performance in the first-year sample. Results of the independent samples t-test*

	Human translators		Post-editors		t-test	p
	M	SD	M	SD		
Style errors	7.95	1.83	6.12	2.04	2.04	.054
Total number of errors	25.04	3.60	21.31	4.66	1.97	.065

note: M = mean, SD = standard deviation

Similarly to the first-year student sample, no significant differences were found in the second-year group (n = 27) between the time needed to translate and the time needed to post-edit the text (human: M = 42.95 min., SD = 8.20; post-editor: M = 37.48 min, SD = 9.50, $t(23) = 1.50$, $p = 0.15$). However, a number of significant differences were found in error numbers, and they show that post-editors, again, outperformed translators in accuracy, fluency, and overall quality (see Table 3).

Table 3. *Significant differences between human translator and post-editor performance in the second-year sample. Results of the independent samples t-test*

	Human translators		Post-editors		t-test	p
	M	SD	M	SD		
Accuracy errors	8.31	3.08	6.44	1.72	2.03	.053
Fluency errors	4.90	3.19	2.50	1.45	2.34	.037
Total number of errors	22.77	4.03	18.75	3.36	2.82	.009

note: M = mean, SD = standard deviation

3.2 Differences between first-year and second-year students

A series of independent samples t-tests were performed to determine whether there are significant differences in speed and performance between first-year and second-year students. Again, differences were checked separately in the human translator and in the post-editor groups.

As Tables 4 and 5 show, second-year students were significantly faster than first-year students both in the human translation and in the post-editing condition. Moreover, second-year human translators made significantly fewer errors in Style and Terminology, whereas second-year post-editors outperformed first-year students in fluency.

Table 4. *Significant differences between the performance of first-year and second-year students. Results of the independent samples t-test*

	First-year students		Second-year students		t-test	p
	M	SD	M	SD		
Human translators						
Time	53.6	15.51	42.2	8.02	1.95	.066
Style errors	7.95	1.84	5.77	1.78	2.83	.010
Terminology errors	4.86	0.90	3.77	1.20	2.43	.025
Post-editors						
Time	52.21	10.25	37.49	9.50	3.45	.002
Fluency errors	4.69	2.15	2.50	1.45	2.96	.007

note: M = mean, SD = standard deviation

3.3 The role of background factors in the second-year-student sample

Our third research question focuses on how background factors may be related to translation performance. To reveal possible relations, Pearson correlation coefficients were computed between the hypothesized background factors and the indices of performance. Correlations were only studied in the second-year sample, as the first-year sample was deemed to be too small for the analysis. The background factors involved in the analysis were reading competence, grammar competence, thematic knowledge (on bilingualism), and time taken to prepare the target text.

In the human translator subsample of the second-year student group, no significant correlations were found between any of the background variables and performance indices at all. However, there was a moderate, significant negative correlation between time and accuracy ($r(9) = -0.68$, $p < 0.05$), suggesting that the more time a human translator devoted to the task, the fewer accuracy errors they made.

A number of significant negative correlations were found in the post-editor group, all of them in the moderate category (see Table 5). Both Use of English and subject knowledge tests scores showed a negative correlation to the total number of errors, which means that higher grammar competence and an in-depth knowledge of bilingualism was accompanied by higher overall performance. Bilingualism tests scores were also negatively correlated with fluency errors and style errors. In addition, significant negative correlations were found between time and terminology errors, suggesting that more time on task resulted in a smaller number of terminology errors.

Table 5. *Significant correlations between background variables and translation performance in the second-year post-editor group*

Variables	Grammar competence (Use of English)	Subject knowledge (bilingualism)	Time on task
Total number of errors	-.58*	-.65**	n.s.
Fluency errors	n.s.	-.59*	n.s.
Style errors	n.s.	-.51*	n.s.
Terminology errors	n.s.	n.s.	-.66**

4 Discussion

Our first research question focused on the differences between translation and post-editing in relation to efficiency. The research question was studied in two samples: first-year students, who had no experience either in translation or in post-editing, and second-year students, who were about to complete their studies but had not received explicit training in post-editing. The efficiency indices involved in the study were translation/post-editing error numbers and time taken to complete the target texts.

In the first-year sample no significant difference was found between translators and post-editors in terms of time, but post-editors made significantly fewer errors overall, and fewer errors in style, in particular. This means that post-editing resulted in better quality target texts, although it did not decrease the time necessary to complete the task. The fact that these students had no prior experience with translation or post-editing leads us to the assumption that other individuals or professionals with high language proficiency but without training and experience in translation would show similar performance. In other words, post-editing MT would help them produce better quality target texts if they needed to translate something, but they could not save a considerable amount of time.

Although the studied populations were different, the findings also align with those of Friederer and O'Brien (2009), who found that post-edited texts got higher scores for accuracy and clarity, and with those of Plitt and Masselot (2010), whose results show

that post-edited texts contained fewer errors than target texts of HT. The results on the temporal aspects of human translation and post-editing are consistent with Garcia's (2010) and Carl et al.'s (2011) findings, who could not find differences between the two groups either.

Results in the second-year sample showed a similar pattern to the those in the first-year sample. That is, post-editing did not lead to any time gains, but it resulted in better performance: post-editors outperformed translators in accuracy, fluency and overall quality.

In summary, it can be argued that full post-editing, when carried out by students with no or little experience but with some subject knowledge, will lead to better quality target texts than traditional, from scratch translation. Nevertheless, no evidence was found for post-editing being faster.

The second research question focused on the differences between first-year and second-year students. Our findings indicate that second-year students work much faster than first-year students: the time gain was 11 minutes (20%) in the human translator group and close to 15 minutes (29%) in the post-editor group. However, this improved temporal efficiency was not accompanied by quality improvement. The total number of errors did not change significantly between the beginning of the first and the end of the second academic year. Interestingly, some types of errors did decrease significantly, namely style and terminology errors in the human translator group and fluency errors in the post-editor group. These results are of particular importance if we consider that students had not received training in post-editing before data collection, but they had gone through traditional translation training. Their improved results indicate that post-editing performance (and presumably competence, too) benefits from traditional translation training as well. Obviously, this does not mean that explicit training in post-editing should not be provided, but it demonstrates that teaching from scratch translation to trainees is not a waste of time at the digital age.

Overall, these findings suggest that formal training may implicitly teach students how to produce approximately the same quality text in a shorter time. It is also worth noting that, even if the total number of errors did not show a significant drop, there was an inner redistribution of errors, indicating that human translators learnt how to find equivalents for terms and how to follow the stylistic requirements of the target language, and post-editors learned how to spot fluency mistakes in the MT output and correct them.

The third research question sought to determine the relation between background factors (time, source language competence, and subject competence) and translation/post-editing performance. In this study, time proved to be a key background factor, which showed a significant relationship with accuracy in the human translation condition and with terminology in the post-editing condition. More specifically, students' temporal efforts are related to accuracy and terminology

improvements. In other words, more accurate human translation and terminologically more correct post-edited texts require more time.

In addition, in the post-editor group, thematic background knowledge and grammar competence emerged as crucial background factors. Both of them were significantly related to overall quality, and thematic background knowledge also showed significant correlations with fluency and style.

These findings may seem self-evident; however, they are in contrast with previous results on background factors affecting legal translation (Lesznyák et al. 2022). When comparing and explaining findings from this study with the mentioned previous findings on legal translation, the differences between the source texts must be emphasized. The bilingualism abstract was a text whose content and form had long been familiar to students. On the other hand, a copyright contract, which was the source language text in the legal translation / PE task, was something that students had just got acquainted with shortly before data collection took place. It should also be highlighted that both thematic background tests (the bilingualism and the copyright law tests) focused on the narrow field the relevant source texts covered.

In the legal text condition, time showed no correlation with performance. The conclusion is that spending more time on the translation/post-editing task is only a crucial factor in performance if the translator works within their own domain. Another difference between the findings of the two studies is that in the legal translation study, there was no significant correlation between subject/thematic knowledge and translation/post-editing performance. Nevertheless, language competence, particularly reading, played a major role in legal translation performance. A possible explanation for the different findings is that whenever translators work with a text that falls within the area of their expertise, subject competence counts. However, when they work in a field that is largely unknown for them, it seems to be irrelevant how much they know about the narrow topic of the text itself. In these situations, it is reading competence that helps translators compensate for their lack of wider, general background knowledge.

These findings underline the complexity of translation and post-editing performance, suggesting that the interplay of several external and internal factors may create numerous different setups, in each of which different sub-competencies of the translator may prove to be vital in performance.

Conclusions

The purpose of the current study was to reveal differences between the efficiency of post-editing and translation in a student sample when translating a text with a relatively familiar content. The role of background factors was also studied.

We found that post-editing brings no time gains, but it results in better quality target texts. In addition, second-year students, both translators and post-editors, work faster than first-year students, however, the overall quality of their target text does not improve. Nevertheless, they show improvement on some aspects of translation quality, suggesting that there is an inner restructuring of error types, with some errors decreasing in number, while others slightly (but not significantly) growing. As for background factors, time and subject/thematic knowledge emerged as crucial factors related primarily to post-editing performance, but to some extent, to translation performance, as well. Some of our results are in sharp contrast with our previous findings on legal translation; a detailed description was given on the possible reasons of this in the Discussion section.

The empirical findings in this study provide a new understanding of how translation students can profit from post-editing and of how background factors may influence their performance. It also appears to be the first study to investigate background factors in post-editing in an empirical manner.

There are several limitations to this study: the sample is relatively small, particularly when it is further divided into groups for comparisons. Additionally, participants are from one particular university in Hungary, which may limit the generalizability of the findings, although it is generally true that most empirical studies in translation research are carried out in just one institution. Another shortcoming of the study is that a major background factor, namely target language competence, was not tested due to a lack of appropriate instruments.

The limitations of the study give hints on what further research should focus on. On one hand, the large amount of data collected within the large-scale research project should be further analyzed, thus data from more participants could give a more refined picture on students' translation and post-editing performance and competence. Testing Hungarian (that is, the target) language skills would be vital, too. In addition, including professionals in the study would be very important to see differences between trainees and professionals. We have started working on these tasks and hope to have further results soon.

On the other hand, a systematic, empirical comparison of training methods and strategies is needed to discover how training institutions could best foster trainees' post-editing competence. In other words, different training programs in different institutions, preferably in different countries should be compared to move beyond simply suggesting (otherwise valuable) activities.

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