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## **A Case Study on the Effectiveness of Teaching Morphological Analysis for Translating Medical Terminology**

*Gökçen HASTÜRKOĞLU <sup>1</sup>*

### **ABSTRACT**

For demonstrating the effectiveness of morphological analysis for teaching how to address medical terminology during medical translation, a case study of a specific training session focusing on Latin and Greek roots and affixes is designed. Sixty students were divided into experimental and control groups, and were assigned to translate 10 sentences including 10 medical terminologies from English into Turkish, presented within the context of academic articles. Specifically, the task involved translating these sentences to be published in a popular journal. The experimental group received training on the morphological analysis of medical terminology for translation purposes for three weeks. After the training, both groups were given a post-test and, later, the accuracy of the translations in the pre- and post-test were compared statistically. The results revealed that teaching morphological analysis of medical terminology is an effective tool for yielding more accurate translations and should become a part of medical translation courses.

**Key Words:** Medical terminology, medical translation, morphological analysis, terminological competence, translator training.

## **Tıp Terminolojisi Çevirisinde Morfolojik Analiz Eğitiminin Etkililiği Üzerine Bir Çalışma**

### **ÖZET**

Tıp metinleri çevirisinde, özellikle tıp terminolojisi çevirisinin eğitiminde, morfolojik analizin etkililiğini göstermek amacıyla, Latince ve Grekçe kök ve eklere odaklı özel bir eğitim çalışması tasarlanmıştır. Bunun için, altmış öğrenci kontrol ve deney grubu olarak eşit bir şekilde ikiye ayrılmıştır ve bu öğrencilerin akademik makale bağlamında sunulan ve içerisinde toplam 10 tıp terminolojisi bulunan 10 cümleyi popüler bir tıp dergisi için çevirmeleri istenmiştir. Sonrasında, deney grubu üç hafta boyunca tıp terminolojisinin morfolojik analizi üzerinde eğitim görmüştür. Eğitimin sonunda her iki grup son teste tabi tutulmuştur ve ön ve son testleri çevirilerinin doğruluğu açısından karşılaştırılmıştır. Sonuçlar, tıp terminolojisinin morfolojik analizine ilişkin eğitimin daha doğru çeviri ortaya çıkartmak için etkili bir araç olduğunu ve tıp metinleri çevirisinde kullanılması gerektiğini ortaya koymuştur.

**Anahtar Kelimeler:** Tıp terminolojisi, tıp çevirisi, morfolojik analiz, terminoloji yetkinliği, çeviri eğitimi

<sup>1</sup> Dr. Öğr. Üyesi, Atılım Üniversitesi, gokcen.hasturkoglu@atilim.edu.tr, ORCID: 0000-0002-0219-7850.

## 1. Introduction

Medical translation is among the oldest types of translation which is considered as a sub-type of scientific and technical translation requiring a special field of expertise, as it has "its own characteristic features" (qtd. in Munoz-Miquel, 2016, p. 235), as Montalt put forth. It has been acknowledged that there is always a need for qualified translators and interpreters specialized in this particular type of translation and it is for this reason that departments of translation and interpretation offer medical translation courses to train students in the medical field.

In training students in the field of medical translation, the study of terminology, a subcompetence of translation, becomes an indispensable tool which targets "the use of terms in real life contexts, and situate these specialized knowledge units within the context of dynamic communication processes" (Martinez and Benitez, 2009, p. 88). Teaching how to understand and translate terminology according to the context is one of the main aims of medical translation courses. During training, students get acquainted with a range of genres, from academic articles, medical textbooks, health information brochures to patient information leaflets, medical journals; some of which are produced for the lay person, while others are written for specialized medical professionals. The most common and prominent aspect of these specialized fields is that they mainly share Greek and Latin terms, thus making translation very challenging.

As translators frequently work also as terminologists and terminographers (Wright and Wright, 1997), while training translation and interpretation students in medical translation, it is required to put emphasis on the characteristics of medical terminology which may be composed of a suffix, a prefix, a root, and a combining form and they should be taught about the importance of grasping the meaning of each part in order to translate accurately. The complex characteristic of medical texts makes the instructors of translation and interpretation at universities adopt a different approach during medical translation courses compared to those used while training students for other types of translation.

Necessity of developing terminological competence for translation and interpretation students has been discussed by a number of notable researchers such as Fedor de Diego (2003), Faber (2004), Martinez and Faber (2009). Wakabayashi's (1996) work, for instance, adopts a pedagogical approach towards medical translation and focuses on the requirements of the medical translation courses. She insists on the fact that a medical translation course should include information on resource materials, provide terminological knowledge by presenting Latin and Greek roots, affixes and combining forms, common medical abbreviations, lay terms versus medical terms, and medical English style. Oğuz (2013) aims to present the problems encountered in translating medical texts, one of which is terminology, by providing examples from English into Turkish and stresses that the translator's task is to be aware of the purpose and intent behind the text and translate accordingly. Similarly, Browne (2016) refers to problematic areas and tries to shed light on the complexity of medical translation.

Despite the studies on the requirement of the development of terminological competence in translator and interpreter training, and the ways and strategies for achieving this, there has not been an emphasis on the effectiveness of teaching how to conduct the morphological analysis of medical terms. Thus, this article intends to demonstrate the necessity of conducting morphological analysis for translation and interpretation students especially in medical translation courses through a case study. The focus is on a different approach trainers should adopt while teaching medical translation strategies given the complex nature of medical terminology compared to other texts.

## Theoretical background

### Medical Genres

Medical discourse includes a variety of forms of communication. It is a specific discourse as “the specialist use of language in contexts which are typical of a specialized community stretching across the academic, the professional, the technical and the occupational area of knowledge and practice” (Gotti, 2008, p. 24). In this particular discourse the user, the domain of use and the main application of language are of key importance (Karwacka, 2015, p. 272). In terms of language, Lankamp (1989, p. 21) distinguished between major variations of medical language: (1) language of medical education (e.g. textbooks), (2) language of medical occupation (e.g. journal articles), (3) language of medical journalism (e.g. popular medicine), (4) doctor/patient language, (5) medical technical language (e.g. manuals). Thus, it can be asserted that the use of medical language changes according to the communicative function or the target group.

There can be “expert-expert and expert-lay communication, with characteristic features varying from genre to genre, depending on the communicative situation and its participants” (Karwacka, 2015, p. 272). For instance, among the medical genres, conference proceedings, academic articles, discharge summaries, and case histories are specially written for medical professionals; whereas popular medical articles, brochures, and patient information leaflets are produced for the lay person. Contrary to the genres written for the specialized medical professionals, those produced for ordinary individuals are required to be written in a clear manner in order to be easily understood. Thus, readability and user-friendliness can be regarded as key elements for the translation of such texts. However, one of the most common characteristics of specialized medical texts is their consisting of complex medical terminologies which puts a heavy burden on translators who strive for accuracy. On the other hand, while translating popular medical genres, as different register is in play in such texts, translators tend to use less complex terminologies in order to be more audience-oriented.

### Medical Terminology

Medical terminology is defined as “a set of words which accurately describe human body and its processes in a scientific manner” (qtd. in Browne, 2016, p. 122). The majority of medical terminology in English is derived from Latin and Greek sources – naturally a hurdle for medical translators to master all terms and topics. As put forward in the study of Dzukanova (2013), there are four main types of term formation: “1. morphological by means of derivation, compounding, abbreviation; 2. syntactic by forming collocations and multi-word phrases and 3. semantic by narrowing (specifying) the meaning of common words; by metaphoric and metonymic transfer of the previous meaning; 4. borrowing words from other languages” (p. 57). This is also the case for English medical terms which usually consist of suffixes, prefixes, word roots, and combining forms.

To explain these linguistic parts individually, roots are probably the first to be defined, as they contain the basic meaning of a word, and generally, but not always, “indicate the part of the body involved” (Ehrlich and Schroeder, 2014, p. 1). For instance, the Greek root meaning ‘blood vessel’ in English is ‘angi’. In turn, a prefix is the part of a word which changes its meaning by attaching to its beginning. It “usually, but not always, indicates location, time, number, or status” (ibid.). For example, ‘hypo-’ means ‘low’ or ‘decreased’. Finally, a suffix is a word part which modifies the meaning by coming at the end of a word. It “usually, but not always, indicates the procedure, condition, disorder, or disease” (ibid.). For instance, ‘-malacia’ means ‘abnormal softening’. A combining vowel is used to make pronunciation

easier when used between two roots, or between a root and a suffix if the suffix begins with a consonant (Salamanca, 1996, p. 94). For instance, the combining form for the word 'gastr' which is 'stomach' is 'gastr/o'.

### Medical Translation and Terminological Competence

Although there are a number of medical writing which are primarily intended for doctors, nurses and students of medicine, there are also many medical genres specifically produced for lay person. Whether the text is written for people of medicine or for the general public, one of the main aims of the translator is to assess his/ her reader accurately and translate accordingly.

... the translator's object is to elicit equivalent effect-that is, to attempt to produce the same cognitive and to a lesser extent emotive impression on his reader as, to the best of his belief and imagination, the writer of the original produced on his own (average) reader. Usually, his first aim is factual textual accuracy and his second a natural, sympathetic way of writing that will interest his reader. He must therefore assess his reader (articles for laymen and for specialists have different styles), and he has to translate effectively... (Newmark, 1979, p. 1405)

The translator should be aware of the principal characteristics of the source and the target genre and decide on the degree of formality, use appropriate language, and translate as such. More specifically, if translation is done for the ordinary individuals, in order to achieve lay-friendliness, translators have to overcome the problem of Latin and Greek medical terms, frequently hampering lay-friendliness in English (Jensen and Zethsen, 2012, p. 39) and also in Turkish. Taking into account the characteristics of the target group, translators should decide whether they have to use scientific terms or simpler terms for a medical condition or treatment. For example, in Turkish, the scientific term for 'high blood-sugar disease' is 'diyabet', similar to the English 'diabetes'. However, in daily usage, most Turkish people use the term 'şeker hastalığı', literally 'sugar disease'. Thus, if translation is intended for the lay person or the popular journals alone, then translators should choose the daily usage of medical terms in order to be clearly and accurately understood.

Unfamiliarity with the terminological units is one of the most significant obstacles that translators have to overcome while translating medical texts and according to Martinez and Faber (2009), it can be resolved through the following strategies:

- the identification and acquisition of specialized concepts activated in discourse;
- the evaluation, consultation, and elaboration of information resources;
- the recognition of interlinguistic correspondences based on concepts in the specialized knowledge field;
- the management of the information and knowledge acquired and its re-use in future translations. (p. 92)

As a subcompetence of translation competence, translation competence is aimed to be developed through these set of abilities during translator and interpreter training. The important point which is to acquire the knowledge embedded in medical terms can be achieved through the knowledge of contextual and linguistic units of these terms. That is why, while translating medical terminology, the knowledge of how terms are constructed is extremely helpful for translators and interpreters which

requires the development of morphological skills. Gyls and Wedding (2009) suggested three steps in order to grasp the meaning of medical terms: “a) Define the suffix, or last part of the word. b) Define the first part of the word (which may be a word root, combining form, or prefix). c) Define the middle parts of the word” (p. 2). The knowledge of each linguistic unit and getting familiar with Latin and Greek roots, suffixes, and prefixes help translators and interpreters achieve more accurate translations.

### **Aim of the study**

The aim of the study is to support the view that in dealing with medical translation, translators need to have enough morphological knowledge in order to convey the meaning of the terms accurately, which becomes more important as they may not be able to understand initially the meaning of a medical terminology in its entirety. The study asserts that while training students in medical translation courses within translation and interpretation departments, trainers should instruct the students on how to do morphological analysis; in other words, how to divide medical terms into their roots, prefixes, suffixes, and combining forms, and predict the meaning of each linguistic part concisely. Later, we aimed to examine whether training students to conduct morphological analysis for medical terms is effective to improve their terminological competence in medical translation.

### **Hypotheses**

As for the hypotheses of this study, the main expectation is that training the experimental group on the morphological analysis of medical terminology would have a significant effect on the achievement of terminological problems encountered during translation and on the development of terminological competence. More specifically, in order to grasp the meaning of each medical term, the participants are supposed to benefit more from dividing the medical term into suffixes, prefixes, and roots and predict the meaning of the whole term, and translate accordingly.

## **Methodology**

### **Participants**

The participants who were given the translation task, as pre- and post-test, comprised 60 sophomore and junior students who had taken the courses of ‘Text Studies for Translation’ and ‘Introduction to Translation’ in the Department of Translation and Interpretation, Atılım University, Ankara, Turkey. The course of ‘Text Studies for Translation’ provides the students with the necessary knowledge about the written and spoken genres and their characteristics. In return, the students are expected to learn how they should approach each genre for translation. Apart from this, the course entitled ‘Introduction to Translation’ offers basic theoretical background for translation and the conventional approaches to translation, thus expanding the students’ theoretical knowledge and practical skills in translation. It was a requirement for all participants to pass these courses with AA (90-100 points), BA (85-90 points), or BB (80-85 points). The participants were randomly divided into two groups: 30 for the control group and 30 for the experimental group.

### **Translation Task**

The participants were assigned a translation task on paper, both before and after the training without access to any dictionary. The main reason behind this was to encourage individuals to rely on their background knowledge, linguistic skills, and use contextual information of the source texts.

In the task itself, they were asked to translate 10 medical terms - 5 constructed with a suffix and 5 with a prefix - from English into Turkish. Each term was presented to them in a short paragraph, within a context of a medical academic article and they were informed that the translation was intended for the lay person and that it would be published in a popular medical journal. They were also asked to provide justifications for their translations after each paragraph.

### Training

The experimental group received training on morphological analysis for translation, recognizing roots, prefixes, suffixes, and combining forms, and they were instructed on how these linguistic parts are combined to form medical terms.

The learning outcomes of the training were as follows: The participants would be able to identify the four word parts, a root, a prefix, a suffix, and a combining form, which are used to build medical terms; divide medical words into their components parts; use their knowledge of the word parts to analyze unfamiliar medical terms; and finally define and learn the definition of common prefixes, suffixes, and roots used in medical terminology.

The training lasted three weeks in the structure of a regular lecture in the curriculum. It took place on Wednesdays at the seminar room of the Department, with each lecture lasting three hours.

In the first week, in order to make the participants more familiar with how to do morphological analysis, they were provided with information on how to determine a suffix, a prefix and a root by giving the definitions of each term in English. Then, some exercises on morphological analysis were conducted. After learning what roots, suffixes, and prefixes are, they got prepared to apply this knowledge by doing certain exercises to define the given medical terms. For instance, the term 'myalgia' can be analyzed into the following components: my: muscle (root); -algia: pain (suffix); myalgia: muscle pain. Another example is 'hyperpyrexia' which can be analyzed as: pyrexia: fever (root); hyper-: high (prefix); hyperpyrexia: high fever. Or the morphological analysis of 'splenomegaly' is: splen: spleen (root); -megaly: enlargement; -o: component part; splenomegaly: enlargement of the spleen.

Before the second week, in order to make the participants familiar with the medical terminology, they were delivered annotated handouts consisting of commonly used medical terminology constructed with prefixes, suffixes, and including combining forms in English. Among these commonly used terminology, the ones included in the pre-test and post-test were excluded. In the handouts, the experimental group was provided with prefixes and suffixes with their definitions and naturally-occurring examples alongside some root words again with meanings, which can be considered as the most common ones. They were asked to investigate the instruction sheets and get acquainted with these linguistic parts before the beginning of the second week. The second and third week consisted of practices to determine the meaning of medical terms through morphological analysis.

The participants were reminded that the meaning of a term generally but not always reflect the exact meaning of each linguistic part. For this, they were advised to check the meaning of the medical terms online and in monolingual and bilingual dictionaries during translation. For example, 'cardiectomy' can be deciphered as 'cardi' (root) meaning heart and '-ectomy' (suffix) meaning the 'surgical removal of all or part of'. Therefore, one might assume that the term 'cardiectomy' means the surgical removal of all or part of the heart. However, it actually means the 'surgical removal of the cardia part of the stomach' (Kocatürk, 2005, p. 140). Despite such exceptions, the meanings of common roots, prefixes, and suffixes yield the meaning of the whole medical term.



In the third week, the participants continued with their translation exercises by conducting morphological analyses of the given medical terms. They were provided with medical texts including medical terms with a variety of roots, prefixes, suffixes, from different medical genres and, later, each individual was given feedback as to their translations. At the end of the third week, they were made familiar with a number of common medical terms included in contexts such as anatomy, the digestive, respiratory, and cardiovascular systems, as well as the related diseases and conditions.

### **Analytical Plan**

In the study, the students' pre-training translations were analyzed and their justifications were examined. The medical terms for which no translation was provided were considered as inaccurate translations. After the training, participants in both the experimental and control group were given the post-test in order to investigate whether the training on the morphological analysis of medical terminology helped the experimental group to achieve more accurate translations.

In order to test the hypotheses, prior to the analysis, the difference between the pre-test and post-test rates of accurate translation for each term was calculated. Then, in order to test whether the training had an effect on the terminological competence of the experimental group, a 2 X 2 Repeated Measures ANOVA was conducted. The data were analyzed using the Statistical Package for Social Sciences (SPSS) version 22.0.

## **Findings**

### **Hypotheses Tests**

In order to investigate whether the training on the morphological analysis of medical terms in translation was effective or not, a 2 X 2 Repeated Measures ANOVA was conducted. Accordingly, the main effect for group [ $F(1,58) = 106.34, p < .001$ , partial  $\eta^2 = .65$ ] and time [ $F(1,58) = 162.40, p < .001$ , partial  $\eta^2 = .74$ ] was found to be statistically significant. More importantly for this study, time X group interaction effect was also found to be statistically significant which is [ $F(1,58) = 149.41, p < .001$ , partial  $\eta^2 = .72$ ]. That is, students in the experimental group performed significantly better on providing accurate medical terms after training in the post-test assessment ( $M = 8.03, SD = 2.56$ ) compared to the pre-test assessment ( $M = 1.63, SD = 1.9$ ). Whereas, there was no statistically significant change between the performance of control group students in the post-test assessment ( $M = 1.3, SD = .70$ ) and pre-test assessment ( $M = 1.2, SD = .75$ ).

### **Qualitative Analysis**

Since the main focus of the study was to investigate the improvement in the accuracy of the experimental group's medical translations after the training on the morphological analysis of terms, this section is entirely allocated to the analysis and comparison of translations by the experimental group both in the pre- and post-test.

For the first medical term, 'tonsilitis' (tonsil (root): tonsil; -itis (suffix): inflammation), 14 students translated the term as 'tonsilit' before the training with the justification that they had no knowledge about this terminology. There were 6 students who did not provide any answers, and out of these 6, 3 claimed that they did not use the term 'tonsilitis' as it is impossible for the lay person to understand the meaning of this term. 4 participants translated the terminology as 'bademcik büyümesi' (enlargement of the tonsil) and 3 as 'bademcik hastalığı' (tonsil disease) by providing the justification that they knew what 'tonsil' is, but they had no knowledge about the suffix '-itis'. Only 3 participants in the

experimental group provided an accurate translation, which is 'bademcik iltihabı' before the training stating that they knew what 'tonsil' is and although they did not know the meaning of the suffix, they could guess the accurate translation through contextual clues. After the training, 25 participants provided accurate translations with the justification that they knew both the root and the suffix. However, there were still 3 participants who did not write any translations for this term. Also, there were 2 students translating the term as 'tonsil iltihabı' by stating that they knew the suffix, but not the root.

Before the training the second medical terminology 'hepatomegaly' (hepat (root): liver; -o: combining form; -megaly (suffix): enlargement) was translated by 11 students as 'hepatomegali' by adopting the strategy of transliteration which was not appropriate for the genre of medical popular journals. They all stated in the justification part that they did not know the meaning of the terminology. What is more, there were 6 students who did not provide any translation for this medical term. There were 5 participants who translated the term as 'karaciğer hastalığı' (liver disease), which was again an inaccurate translation as it was an example of overgeneralization. These students provided that they knew what 'hepat' means, but they had no knowledge about the suffix. In addition, there were 3 participants who translated the term as 'akciğer hastalığı' (lung disease) which demonstrated that they confused the terms, the lung and the liver, and also did not know the meaning of the suffix. On the other hand, 5 participants translated 'hepatomegaly' accurately as 'karaciğer büyümesi' (enlargement of the liver) by explaining that they knew the meaning of the root and guessed the meaning of the suffix. The results changed significantly after the training and 24 participants translated the term accurately by providing the justification that they had the knowledge of both the root, the combining form, and the suffix. Nevertheless, there was 1 participant who could not come up with any translation and still 3 participants translated the term as 'hepatomegali' and 2 as 'akciğer büyümesi' (enlargement of the lung).

Furthermore, for the third medical term, 'appendectomy' (appendic (root): appendix; -ectomy (suffix): removal, to cut out), 10 participants provided unacceptable translations before the training as 'apendektomi' by adopting the strategy of transliteration, which was inappropriate for the target reader. There were also 6 participants who did not provide any translations, which were again accepted as inaccurate translations in this study. In addition, 3 participants translated the term as 'apendektomi hastalığı' (appendectomy disease) which is a made-up term. There were also 7 participants who translated the term as 'apandisit hastalığı' (appendix disease) which has no meaning at all. It is clear that they knew what appendix is, but they had no knowledge about the meaning of the suffix, -ectomy. Similarly, 2 people guessed the meaning of the root, but did not know the suffix and yielded inaccurate translations, 'apandisit iltihabı' (inflammation of the appendix). Nevertheless, there were 2 participants who translated the term as 'apandisit ameliyatı' (surgery of the appendix) with the justification that they knew the term entirely. Following the training, the rate of mistranslations dropped dramatically, with inaccurate translations such as 'apandisit büyümesi' (enlargement of the appendix) (n=3) that was a demonstration of confusing the suffixes, -ectomy and -megaly, and 'apendektomi' (3 participants) which did not comply with the target register. There was still 1 participant who did not provide any translation.

In the translation task, the next medical terminology constructed with a suffix was 'cardiopathy' (cardio (root): heart; -pathy (suffix): disease) which was mistranslated by most of the participants prior to the training. Eight participants adopted the strategy of transliteration and translated the term as



'kardiyopati' with the explanation that they had to overlook the characteristics of the target readers, clearly implying that they were not familiar with the terms. The other mistranslation was 'kalp krizi' (heart attack), which was provided by 8 participants who knew the meaning of the root, 'cardio', but did not know what the suffix means. Similarly, there were 2 participants who translated the term as 'kalp patisi' (heart pathy), a non-existent term. There were also 7 participants with no translations. The accurate translation was provided only by 5 participants. After the training, it was observed that the rate of the accurate translations increased significantly with 'kalp hastalığı' (heart disease) provided by 26 participants. However though, there were still 2 students who mistranslated the term as 'kardiyopati' and 2 as 'kalp krizi', demonstrating the fact that they knew the meaning of the root, but had not learned about the suffix during training.

The fifth medical term constructed with a suffix was 'osteomalacia' (osteo (root): bone; -malacia (suffix): softening). Before the training, there were no accurate translations for this term. Twelve participants translated the terminology as 'osteomalazi' by adopting the strategy of transliteration and by not taking the characteristics of the target reader into consideration. There were 2 participants who knew the meaning of the root, but did not know the suffix and yielded the translation of 'kemik malazisi' (bone malacia), which is not a medical term. Other translations were 'kemik kırılması' (fracture), 'kemik çatlağı' (bone crack), and 'kemik erimesi' (osteoporosis), none of which were accurate. Nevertheless, the rate of accurate translations increased to 73.3% after the training and the participants translated the term as 'kemik yumuşaması' with the explanation that they had the knowledge of the meaning of both the root and the suffix. There were still 3 participants who did not provide any translations at all; another 3 used 'osteomalazi', which is not suitable for the target reader; and 2 yielded the translation of 'kemik erimesi', which is a term used for a different bone condition.

For another term constructed with a prefix, 'hypertension', the rate of accurate translation was very high before the training and 4 participants translated the term as 'hipertansiyon' (hypertension) which can be regarded as accurate, because it is used commonly by the Turkish public. Sixteen participants preferred to use 'yüksek tansiyon' (high tension), which was again acceptable in Turkish. There were 6 participants who translated the term as 'yüksek kan basıncı' (high blood pressure), which are Turkish words. However, 3 participants confused the meanings of the suffixes hyper- and hypo- and translated the term as 'düşük tansiyon', which was inaccurate, and also 1 participant provided no translation. After the training, the rate of accurate translation was increased to 100% with 27 translations as 'yüksek tansiyon' and 3 as 'yüksek kan basıncı'.

'Hypoglisemia' (hypo- (prefix): low; glisemia (root): sugar) was another medical term constructed with a prefix in the translation task. Before the training, 8 participants translated the term as 'hipoglisemi' (hypoglisemia) with the explanation that they did not know what it exactly means. Similarly, there were 2 participants without the knowledge of the meaning of the terminology and the pronunciation of the term in Turkish and translated the term as 'hipoglisemiya'. Six participants stated in the justification part that they knew the prefix but did not know the root; thus, they translated the term as 'düşük glisemi' (low glisemia). Two participants confused the prefixes of hypo- and hyper- and translated the term as 'yüksek glisemi' (high glisemia) and they also did not have any knowledge about the meaning of the root. In addition, 6 participants did not provide any translations for this term. However, there were another 6 who translated 'hypoglisemia' accurately and wrote 'düşük şeker' (low sugar) with the knowledge of both the prefix and the root, with some claiming that they made use of the contextual information. After the training, the number of participants giving accurate translations increased

significantly and 26 participants translated the term as 'düşük şeker', explaining that they had knowledge of the meaning of the prefix and the root of this term. There were only 4 participants who still translated the term as 'hipoglisemi' disregarding the characteristics of the target readers.

In the translation task, 'bradycardia' (brady- (prefix): slow; cardia (root): heart; -ia (suffix): state, condition) was another medical term which was translated by the majority of the participants as 'bradikardi' (n=16) before the training, explaining that they had no knowledge about this terminology; that is why, they adopted the strategy of transliteration and did not take into consideration the characteristics of the popular medical journal genre. In addition, 7 participants provided no suggestions for the translation of this terminology. There were 5 participants who translated the term as 'kalp hastalığı' (heart disease), which is a broad term that can be used for any type of heart disease. Similarly, there were 2 participants who knew the meaning of the root, but did not know what brady- means and, thus, translated the term as 'kalp çarpıntısı' (heart throb, tachycardia), the opposite of the source term. After the training, the results again changed dramatically and there were 24 participants with accurate translations as 'yavaş kalp atımı', 'kalbin yavaş çarpması' (slow pumping of the heart). Nevertheless, there were still 2 participants who translated the term as 'bradikardi' and 2 provided no translations. What is more, the remaining 2 participants translated the term as 'kalp çarpıntısı'.

The medical term 'tachycardia' (tachy- (prefix): fast; cardia (root): heart; -ia (suffix): state, condition) which is the opposite of the previous term 'bradycardia, was translated by 19 participants as 'taşikardi', as it is a term also used in Turkish medical sources. However though, in the explanation part, only 4 of them stated that they knew the precise meaning of the term, while the rest translated it without knowing the meaning of the word. As the target text was required to be clear and reader-friendly, they should have explained the meaning of the term or they should have provided the Turkish terminology equal to this term, 'kalp çarpıntısı' (heart throb). Two participants translated the term as 'kalp çarpıntısı' before the training as they already knew what it means. Another inaccurate translation was 'kalp hastalığı' (heart disease), which is an overgeneralized term used for any type of heart disease. After the training, the same term was translated by the majority of the participants accurately; they suggested the terms 'kalp çarpıntısı' and 'kalbin çok hızlı atması' (very fast throbbing of the heart). Nevertheless, there were still 8 participants who translated the term as 'taşikardi' by adopting the transliteration strategy, which is not appropriate for the target readers.

For the last medical term 'dyslexia' (dys- (suffix): poor or inadequate; lexis (root): words or language), the rate of inaccurate translations provided by the participants before the training was 90%, and all of them was 'disleksi' or 'disleksiya' with the explanation that they used the transliteration strategy, as they did not know the meaning of the term. There were also 7 participants who did not translate the term. What is more, 2 participants mistranslated the term, as they confused the meaning of the term and provided 'konuşma bozukluğu' (speech impairment). However, 3 participants yielded accurate translations as 'okuma bozukluğu' (reading impairment) with the justification that they had already known the meaning of the term. After the training, there were 21 participants yielding accurate translations stating that they learned the meaning of the term during the training. Nevertheless, there were 5 participants who did not provide any translations and there were still 4 participants who translated the term as 'konuşma bozukluğu'.

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## Conclusion

Translation of medical texts poses a great challenge to translators mainly because of Latin and Greek terms the medical texts include. It not only requires good knowledge of English, as lingua franca, but also that of medical terminology and topics. However though, knowing the meaning of a medical term in its entirety is almost impossible for a translator. In this respect, in order to develop terminological competence, it is helpful to carry out morphological analyses of these terms which involves dividing words into their separate components of root, combining form, prefix, and suffix, and being familiar with and having the knowledge of these parts individually.

This study is an attempt to investigate the efficacy of instructing undergraduate students of translation and interpreting in achieving morphological analyses of medical terms by investigating the results of translation tasks assigned before and after training. The overall motivation behind the present work is to demonstrate that training students in this field should involve instructions on morphological analyses of medical terms, as the knowledge of the common Latin and Greek roots and affixes is very helpful in determining the meaning of English medical terms in their entirety and achieving terminological competence.

The efficacy of the instruction on the morphological analysis of medical terms was also statistically revealed with the data gathered from the pre-test and post-test, which demonstrated a significant difference between the control and the experimental group's accuracy of translation from English into Turkish in the post-test.

The results demonstrate that, prior to the training, without the knowledge of the meaning of each part constituting the term, the participants tended to adopt transliteration strategies and disregard the characteristics of popular medical journals, thus yielding inaccurate translations. It was observed that the rate of accurate translations was high only when the medical terminology was also identically used in Turkish.

The three-week training program is found to be useful in teaching students how to carry out morphological analyses of the medical terms and how to determine the meaning of these terms through their component parts, and thus in helping students develop their medical terminology competence. This positive change in the number of accurate translations after the training in this research is indicative of the idea that instructors or trainers should adopt a different approach to teaching how to translate medical texts as opposed to other types of translation.

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