



Investigation of the Translation Techniques Used by EFL students in Translating Scientific Texts from English into Arabic

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Abstract

This study investigates the proficiency of university English Language students in translating scientific texts in their contexts. The main aim of the study is to identify the translation techniques used by the students in translating scientific texts from English into Arabic. For this purpose, the researcher asked 20 students from the English Department, Faculty of Art, Zawyia University, to translate scientific texts using appropriate translation techniques. The students' translations were analyzed in view of common translation techniques identified by translation scholars such as Newmark, Byrne, Molina and Hurtado Albir and Munday. The study findings show that the students lack the necessary knowledge and skills needed for translating scientific texts from English into Arabic, especially the use of translation techniques such as modulation, transposition, omission, restructuring and addition.

ملخص الدراسة

يدرس هذا البحث كفاءة طلاب قسم اللغة الإنجليزية في الجامعة في ترجمة النصوص العلمية بما يتاسب مع سياقها. والهدف الرئيس من هذه الدراسة هو تحديد طرق الترجمة التي يستخدمها الطلاب عند ترجمة النصوص العلمية من الإنجليزية إلى العربية. لتحقيق هذا الهدف طلب من 20 طالبا من قسم اللغة الإنجليزية بكلية الآداب في جامعة الزاوية ترجمة نصوص علمية باستخدام طرق الترجمة المناسبة. تم تحليل ترجماتهم في ضوء طرق الترجمة التي حددها باحثون مثل نيومارك وبيرن ومولينا وهورتادو ألبير وموندai. أظهرت النتائج أن الطلاب يفتقرن إلى معرفة المهارات الأساسية اللازمة لترجمة النصوص العلمية بفعالية، خاصة فيما يتعلق باستخدام طرق الترجمة مثل القلب والتغيير النحوي وإعادة الصياغة والاضافة.

1. Introduction

Language plays an important role in communication within communities of different cultures, serving as a way to convey information and ideas among people in various fields. One of these fields is science which is an important branch of knowledge requiring accuracy of language. This is because of the intricate nature of scientific concepts and the continuous development of science. Each science contains its specific terms that distinguish it from other fields. For some nations, the acquiring of scientific knowledge requires translation of scientific works from original source languages, such as English, into their target language, such as Arabic. According to Newmark, translation is "rendering the meaning of a text into another language in the way that the author intended the text". (Newmark 1988: 5). According to Nida and Taber "translating consists in reproducing in the receptor language the closest natural equivalent of the source-language message, first in terms of meaning and secondly in terms of style" (Nida and Taber 1969: 12). On his part, Giaber (2019: 26) defines translation as "the user-oriented reproduction of the source text message in an appropriate form in the target language with the aim of creating a pragmatically equivalent and functionally adequate target text". The complexity of scientific texts demands translators to use different translation techniques to accurately express scientific concepts when translating texts from the source language into the target language. A translation technique is "the transfer mode or procedure opted for by the translator in rendering a micro-level unit of the ST (e.g., word, abbreviation, phrase, sentence) or feature (e.g., sound effect) in a specific context" (Giaber 2019: 108).

This study explores the challenges facing students in translating scientific texts from English into Arabic with the aim of identifying and analyzing the translation techniques they use to overcome lexical and grammatical problems resulting from the intrinsic differences between English and Arabic. This study intends to identify effective practices and propose ways for achieving accurate translations of scientific texts from English into Arabic.

This section of the paper introduces the research issue and aim, and highlights the importance of scientific translation. The second section provides literature review, summarizing previous studies on the issues involved in translating scientific texts and translation techniques employed. The third section of the study describes the research methodology, focusing on participant selection and the processes of data collection and analysis. The findings are presented in the fourth section, which highlights the common challenges faced by students when applying various translation techniques, including omission, modulation, transposition and addition. The fifth section discusses the findings, offering insights into how to apply these techniques effectively for better translation quality.

2. Hypothesis

This paper hypothesizes that in translating scientific texts, most students do not know how to use translation techniques to overcome the translation problems resulting from the grammatical and stylistic differences between English into Arabic.

3. Literature review

This study examines how BA students use common translation techniques, such as restructuring, transposition, borrowing, addition, omission and expansion, to overcome issues related to lexical and grammatical differences between Arabic and English when translating scientific texts. The following is a summary of some previous studies on the issues related to the translation of scientific texts from English into Arabic and the use of relevant translation techniques. The following are views of some scholars and writers on this issue. In a study titled "Difficulties faced by translation students in translating scientific texts from English into Arabic", Nouri (2011: 13 and 14) found out that the students faced difficulties in translating specialized texts, particularly when relying on general dictionaries, which made it harder to handle technical terms. The study also reveals poor performance in translating specific terms, and that the students often make errors

by using general dictionaries. To enhance their skills, the study recommended that students should be trained in using both monolingual and bilingual dictionaries effectively for translating specialized texts. Both this conclusion and the current research emphasize that the primary challenge in translating scientific texts effectively is the lack of proper tools and skills. In her study, Alsmadi (2022: 11) titled "Challenges in translating scientific texts: Problem and reasons", examines the major difficulties translators face when translating scientific texts from English into Arabic. The research identified several major challenges: first, syntactic issues such as word order, agreement, tense, aspect, and passive structure. Second, lexical challenges, including word selection. Third, translation methods: the study pointed out errors in the use of translation techniques, particularly with regard to addition and omission. Alsmadi attributes the reasons of these difficulties to several factors, including the translator's limited experience in scientific translation, and insufficient understanding of the subtle differences in scientific texts. She suggested that improving translator's expertise and awareness of these nuances could help address these challenges. The results of her study indicate the necessity of improving training methods and developments related to technical and scientific translation to enhance and develop translator's skills and improve the overall quality of translated scientific materials. The study indicated that the main reason for students' lack of experience was due to these challenges.

A relevant study by Abdullah (2020: 11, 12) titled "Translation problems facing fourth semester students of English in translating scientific texts from English into Arabic- A case study reveals that students face difficulties to understand the meanings of technical terms due to insufficient training on translation techniques. The author emphasized the importance of providing students with a strong academic background in scientific translation methods, enabling them to accurately handle technical and scientific terms without altering the meanings. Moreover, she pointed out that students had limited opportunities for practical training in scientific translation during their fourth semester, which

negatively impacted their performance. She suggested increasing practical classes on translating scientific texts to improve students` skills. Similarly, my study reveals that fourth-semester students at Zawiya University experience similar translation challenges. Abdullah's study emphasizes the importance of developing students` linguistic and contextual understanding to improve the accuracy of their translations. These findings match the current study, which also emphasize the need to improve training and resources to address the complexities of scientific translations.

4. Research Methodology

This study employs a combination of descriptive and analytical approaches, utilizing both qualitative and quantitative methods to analyze translation techniques. The texts were characterized by complex sentence structures that reflect the academic and scientific nature of the study, with multiple clauses linked by conjunctions such as "because", "which", "and", and "but". The texts also uses specialized technical terminology which are necessary to the subject matter and contribute to a formal tone. The study participants were 20 students from Zawiya University, English Department, 8th semester whose age was between 20 and 21 years. This research is based on the fact the students have studied and practiced translation techniques and have a good command of English. The students were asked to translate some scientific texts from English into Arabic. The texts were taken from a book titled *The Sixth Extinction* by Elizabeth Kolbert. The students' translations were analyzed to identify the problems encountered by the students in translating scientific texts. The student' translations were classified according to types of translation techniques.

5. Data Analysis and Findings

This part of the study presents the data analysis and discussion. Analysis of the students' translations shows that the students have mostly used the literal translation technique. In what follows, the translation techniques used by the students are discussed giving relevant examples from the students' translations.

Example 1: Use of literal translation instead of restructuring:

In the following examples, 6 students out of 20 gave inadequate translations by translating ST nominal sentences into TT nominal sentences using literal translation, where the restructuring technique should have been used. Literal translation is “the rendering of some ST units such as morphemes, words, phrases and sentences by contextually equivalent TL morphemes, words, phrases and sentences” (Giaber 2019: 114). Table 1 outlines examples of the students’ use of the literal translation technique:

Table 1

No.	Source Text	Examples of Students’ translations
1	The crater is almost four miles wide, but when the weather is clear you can see the jagged hills that surround the town like the walls of a ruined tower. (p: 10)	الفوهه غالبا يبلغ اتساع عرضها حوالي 4 اميال ولكن عندما يكون الطقس صافيا بإمكانك رؤية حافة التلال المحيطة بالمدينة مثل أسوار برج مدمرة.
2	EVACC sits more or less in the middle of the golden frog's range, but it is, by design, entirely cut off from the outside world. (p: 13)	مركز "إيفاك" تقريبا يقع في وسط حقل الضفادع الذهبية، غير أنه مصمم لكي يكون معزولاً تماماً عن العالم الخارجي.
3	The town of El Valle de Anton, in Central Panama, sits in the middle of a volcanic crater formed about a million years ago. (p:10)	مدينة الفالى دي انطون في مركز بينما تقع وسط فوهه بركانية شكلت من حوالي 2 مليون سنة مضت.

In translating the above-listed ST sentences, the restructuring technique should have been used. According to Dickins et al (2002: 137), "restructuring is coherence oriented and concerns the way in which languages typically organize their ideas". Translating an English sentence into Arabic usually requires applying the restructuring technique due to the differences in grammatical structure between the two languages. In English, a sentence typically starts with the subject

followed by the verb and then the object, whereas in Arabic the sentence starts with the verb, followed by the subject, and then the object. This difference can lead to ambiguity and misunderstanding in translation. The translator can overcome this problem by using the restructuring technique. The following examples show how restructuring is used to produce more appropriate Arabic translations of the above-listed English sentences:

a. In example 1, the phrase starting with a noun in the English sentence "The crater is almost", should in the Arabic sentence be replaced with a phrase starting with a verb as follows:

يبلغ اتساع هذه الفوهة حوالي اربعة اميال، لكن عندما يكون الجو صافيا يمكنك رؤية التلال ذات القمم المثلثة التي تحبط بالبلدة مثل جدران برج مدمر.

b. In example 2, the English phrase "EVACC sits" should be translated into Arabic as

يقع مركز "إيفاك" تقريرياً في وسط حقل الضفادع الذهبية، ولكنه مصمم ليكون معزولاً تماماً عن العالم الخارجي.

c. In example 3, the ST nominal sentence "The town of El Valle de Anton, in Central Panama, sits" should be replaced with the verbal phrase in the TT as follows:

تقع مدينة الفالي دي انطون في بينما الوسطى في وسط فوهة بركانية تكونت قبل حوالي مليون سنة.

These examples show that due to the students' lack of knowledge of the stylistic importance of word order in translating from English into Arabic, the ST verb is placed in the middle of the sentence, but it should be placed in front of the sentence in the TT without changing the meaning. In English, the verb is typically placed after the subject (subject + verb + object structure). However, in Arabic, the verb comes at the beginning of the sentence (verb + subject+ object structure) to preserve the stylistic and linguistic norms.

Example 2: Use of Literal Translation instead of Omission:

In the following example, 19 students out of 20 made mistakes by failing to omit the ST phrase "San Jose Cochran frogs". Instead, they used literal translation,

where the omission technique should have been applied. Table 2 provides an example of the students' use of the literal translation technique:

Table 2

No.	Source Text	Examples of Students' translations
1	The first amphibian Griffith sighted this way was a San Jose Cochran frog, perched on top of a leaf. San Jose Cochran frogs are part of a larger family known as "glass frogs," so named because their translucent skin reseals the outline of their internal organs. (p:22)	أول البرمائيات التي رصدها غريفيت بهذه الطريقة كانت سان خوسيه كوكران. ضفدع سان خوسيه كوكران هي جزء من عائلة أكبر تعرف باسم "الضفدع الزجاجية" و سمو بهذا الإسم لأن جلدتها الشفاف يكشف الخطوط العريضة لاعضائها الداخلية.

In translating the above sentence, the omission technique should have been used. According to Munday, this technique refers to the "non-inclusion of an ST segment or meaning aspect in the TT" (Munday 2002: 212). As explained by Giaber (2019: 130, 131), the "omission" technique in translation refers to removing a specific part of the source text when translating it into the target text, as it may result in a translation that is unclear in meaning in the target text. The goal is to make the target text more readable and easier to understand, translating it in a smooth and coherent manner.

The translator may choose to omit certain information deliberately from the source text if it is irrelevant to the meaning intended to be conveyed to the target audience. This approach helps preserve the fluency of the target text, making it easier to understand by avoiding the repetition of unnecessary parts of the source text.

In the ST sentence, "The first amphibian Griffith sighted this way was a San Jose Cochran frog, perched on top of a leaf. San Jose Cochran frogs are part of a larger family known as 'glass frogs,' so named because their translucent skin reseals the outline of their internal organs," the ST phrase "San Jose Cochran" is

unnecessarily repeated in the second sentence. This repetition should be omitted in the Arabic translation as follows:

"كان أول برمائي رصده غريفيت هو ضفدع من نوع سان خوزيه كوتشران، وهو جالس على ورقة شجر، ويعتبر هذا النوع من الضفادع جزءاً من عائلة أكبر تسمى "الضفادع الزجاجية" التي سميت كذلك لأن جلدتها الشفاف يظهر تفاصيل أعضائها الداخلية".

The sentence was translated using the omission technique, where the phrase "San Jose Cochran" was omitted from the second part of the sentence because it has already been mentioned earlier in the same sentence. It was regarded as unnecessary and the omission did not affect the overall meaning of the sentence. Since the second part of the sentence focuses on the fact that these frogs are a type of glass frog, this information is sufficient to convey the intended meaning of the entire sentence. The application of the omission technique here is important because it helps simplify the sentence structure, making it clearer, smoother, and easier to understand for the target audience.

Example 3: Use of Literal Translation instead of Transposition:

In the following example, 17 students out of 20 produced inadequate translations by applying literal translation in translating the ST words where the transposition technique should have been used. Table 3 outlines examples of the students' use of the literal translation technique:

Table 3

No.	Source Text	Examples of Students' translations
1	She had no idea what was going on, but since she needed frogs for her research she sets up a new site, farther east. (p: 10)	لم تكن لديها اي فكرة بما يجري، لكن عندما ارادت ضفادع لبحثها قامت بإنشاء موقع دراسي جديد في اقصى الشرق.
2	Practiced hunters can find frogs at night by shining a light into the forest and looking for the reflected glow of their eyes. (p:22)	يستطيع الصيادون المتمرسون العثور على ضفادع ليلاً بتسليط الضوء في الغابة والبحث عن اللمعان المنعكس في عيون الضفادع.

3	<p>The first time I visited EVACC, Griffith pointed out to me the representatives of species that are now extinct in the wild. (p:14)</p>	<p>وفي المرة الاولى زرت مركز "إيفاك" عرض على غريفيث عينات تمثيلية عن الانواع التي انقرضت في البرية.</p>
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In translating the above-listed ST sentences, the transposition technique should have been used. According to Munday (2009: 237), "transposition concerns grammatical shifts in the TT without altering the meaning of the ST segments". In other words, the transposition technique involves "replacing one class or type of word in the ST with another type of word in the TT without changing the meaning" (Byrne 2012: 121). The technique of transposition refers to changes in the grammatical structure of the source text when translating it into the target language to align with the context of the target text. This technique helps the translator select the most appropriate grammatical structure, making the intended meaning in the target language clearer and more fluent. (Newmark 1988: 85, 86). The technique of transposition is used to express a change in the type or category of information from the source language when translating it into the target language, without changing the intended meaning in the source language. This is because keeping the same word type or category may lead to an unclear or inappropriate translation. Therefore, translators employ this technique to improve the quality of the translation and ensure that the flow of information in the target text is natural and consistent with the style of the target languages, as explained by Giaber (2019: 130, 131).

The following examples show how transposition is used to produce more appropriate Arabic translations of the above-listed sentences. Applying the transposition technique in translation is important to ensure accuracy and fluency in the target language. Therefore, the students made some mistakes in translating the provided sentences, as they did not apply the technique correctly, which led to inaccuracies in some cases.

In example 1, the source text states: "Then the frogs around El Valle started to disappear. The problem - it was not yet perceived as a crisis - was first noticed to the west, near Panama's border with Costa Rica. An American graduate student happened to be studying frogs in the rainforest there. She went back to the States for a while to write her dissertation, and when she returned, she couldn't find any frogs or, for that matter, amphibians of any kind. She had no idea what was going on, but since she needed frogs for her research, she set up a new study site, farther east. At first the frogs at the new site seemed healthy; then the same thing happened: the amphibians vanished" (Elizabeth Kolbert 2014: 10). The students made an error in translating 'her research' as 'بحثها' because the context of the previous text makes it clear that since she is a graduate student specialized in the study of frogs, her graduate studies would not be limited to just one research project, but would involve multiple research projects. The meaning is implicitly understood from the context that the word 'research' in the source text should be translated as "أبحاثها" in the target text in order to convey the intended meaning of the source text accurately and clearly to the target audience. Therefore, the students should have translated the ST sentence, "She had no idea what was going on, but since she needed frogs for her research she set up a new site, farther east," as the TT sentence:

"لم يكن لديها فكرة عما كان يجري ولكن بما أنها كانت بحاجة إلى الصفادع من أجل أبحاثها قامت بإنشاء موقع جديد للدراسة في المنطقة الشرقية".

It would have been better to apply the technique of transposition by changing the type of word in the source text from singular to plural in the target text (Byrne 2012: 121). Accordingly, "research" should be translated as "أبحاثها" in Arabic, which helps convey the intended meaning with greater accuracy and clarity for the target audience. Through this transposition, the intended meaning is transferred from the source language to the target language with precision and clarity.

2- In example 2, the students made an error by translating the source text word "frogs" into the target text (TT) word "ضفدع" because in English when referring to a specific group in general, articles are not used, whereas in Arabic, the definite article "ال" is used even when referring to a group in general. In this case, the word "frogs" in the source text refers to frogs in general, and when translated into Arabic, the definite article "ال" should be added to indicate the group in general, making it "الضفدع" instead of just "ضفدع". The translator needs to consider the grammatical differences in word structure between Arabic and English. By using transposition, it becomes easier for the translator to convey the intended meaning of the source text while adhering to the rules of the target language, and this aligns with the style of the Arabic language. Thus, the students should have translated the original sentence "Practiced hunters can find frogs at night by shining a light into the forest and looking for the reflected glow of their eyes" into the following Arabic sentence:

"يمكن للصيادين المحترفين العثور على الضفدع ليلاً من خلال تسلط الضوء في الغابة والبحث عن المعنك في عيونها".

By using the technique of transposition, it becomes easier for the translator to convey the intended meaning of the source text in accordance with the grammatical norms of the target language, as explained by Byrne (2012:121)

In Example 3, when translating the verb "visited" in the source text to the verb "زرت" in the target text, the translation would be inappropriate and may seem unnatural to the Arabic audience because the style differs between English and Arabic. To make the translation more suitable for the target audience, it is better to change the word type from a verb to a noun. Therefore, using the technique of transposition helps convey the intended meaning from the source text to the target text effectively in a way that aligns with the rules of the target language and meets the expectations of its audience (Giaber 2010 : 121 , 122).

The source text: "The first time I visited EVACC, Griffith pointed out to me the representatives of species that are now extinct in the wild," should have been translated as:

"خلال زيارتي الاولى لمركز إيفاك قدم لي غريفيت عينات تمثيلية للأنواع التي انقرضت في البرية".

Example 4: Use of Literal Translation instead of Expansion (or Addition):

Nineteen out of twenty students failed to translate the following example correctly, using literal translation instead of applying the addition technique. They translated the source text phrase "jagged hills" into the target text phrase "حافة التلال". Table 4 outlines the example of the students' use of the literal translation technique:

Table 4

No.	Source Text	Examples of Students' translations
1	The crater is almost four miles wide, but when the weather is clear you can see the jagged hills that surround the town like the walls of a ruined tower. (p:10)	الفوهه غالبا يبلغ اتساع عرضها حوالي 4 اميال ولكن عندما يكون الطقس صافيا بإمكانك رؤية حافة التلال المحيطة بالمدينة مثل أسوار برج مدمرة.

In translating the above-listed ST sentence, the expansion technique should have been used. "The expansion technique, also known as addition or explication, "involves making something implicit in the ST explicit in the TT in order to make the TT clearer, more relevant to the TT audience, or to compensate for a perceived lack of background knowledge on the part of the TT audience. Expansion may involve adding connectors to improve the flow of the text and to make it more readable" (Byrne as quoted in Giaber, 2019: 123). In this example, it is clear that the word "jagged" does not simply mean "edge," but also refers to something "rough and uneven with sharp points." Therefore, translating the phrase "jagged hills" in the source text as "حافة التلال" (edge of the hills) in the target text is not

accurate. Instead, it should be translated using the technique of expansion (or addition) to become " ذات القمم المُثْلَّمة" (rough and uneven with sharp points), which clarifies the meaning more precisely.

As stated in the Oxford Word Power Dictionary (2006: 425), the word 'jagged' refers to something rough and uneven with sharp points. It is evident that the students made an error in translation, as they did not apply the technique of addition, which helps clarify the intended meaning of the source text. By adding one or more words, the intended meaning can be conveyed more accurately and clearly to the target audience.

The source text (ST): "The crater is almost four miles wide, but when the weather is clear you can see the jagged hills that surround the town like the walls of a ruined tower" should have been translated as:

"يبلغ إتساع هذه الفوهة أربعة أميال تقربياً، لكن عندما يكون الجو صافياً يمكنك رؤية التلال ذات القمم المُثْلَّمة التي تحيط بالبلدة كجدران برج مدمر".

Example 5: Use of the Borrowing Technique:

In this example, 19 out of 20 students used the borrowing technique correctly, by directly incorporating words and phrases from the SL into the TL, especially when there is no exact equivalent or to maintain the original cultural meaning. Borrowing is the technique of taking a word or expression straight from the ST and using it in the TT with or without a change in the phonological and/or morphological structure (Molina and Hurtado Albir as quoted in Giaber 2019: 116). Table 5 outlines an example of the students' use of the borrowing translation technique:

Table 5

No.	Source Text	Examples of Students' translations
1-	The town of EL Valle de Anton, in central Panama, sits in the middle of a volcanic crater formed about a million years ago. (p:10)	مدينۃ الفالی دی أنطون فی مركز بنما وسط فوہہ برکانیۃ تشكیلت من حوالي 2 مليون سنة مضت

Most of the students applied the borrowing technique correctly by translating the ST phrase "El Valle de Anton" into the TT phrase "الفالی دی أنطون". The translation of "El Valle de Anton" into "الفالی دی أنطون" uses a borrowing translation technique. This means the original name is directly used in Arabic without modifying its form or meaning. This technique aims to transfer words as they are, without changing their sound, form, or intended meanings, in order to preserve their authenticity and cultural significance. It is used to fill a lexical gap in the TT, especially in translating place names and terms with cultural characteristics that may not have a direct equivalent in the TL. (Giaber 2019: 116)

Example 6: Use of Literal Translation instead of Modulation:

In the following example, 12 out of 20 students used literal translation instead of applying the modulation technique. In the first example, the students made an error by translating the verb "has" from the original text as "تملک" in the target text. In the second example, they incorrectly translated the verb "put" in the original text as "يرتدي" in the target text. Table 6 outlines examples of the students' use of the literal translation technique:

Table 6

No.	Source Text	Examples of Students' translations
1	"When Anning uncovered another, nearly complete plesiosaur fossil, he was, once again, quickly informed of the finding, at which point he had to acknowledge that he'd been wrong." (p:38)	1- "عندما أزال آنинг حفريّة أخرى شبّه كاملاً للديناصور البحري، تم إبلاغه مرة أخرى بسرعة عن الاكتشاف، وفي تلك اللحظة اضطر للاعتراف بأنه كان مخطئاً." "وعندما إكتشف آنинг حفريّة بليسيوصور أخرى كاملة، جرى إبلاغه بسرعة بهذا الاكتشاف، ولذلك كان يجب عليه أن يقر بأنه مخطئاً".
2	"THE El Valle Amphibian Conservation Center, or EVACC (pronounced "ee-vac"), lies along a dirt road not far from the open-air market where the golden frog figurines are sold".(p 13, 14)	2- مركز الحفاظ على البرمائيات في إل فاللي، أو EVACC (الذي يُنطق "إيفاك")، يكون على طول طريق ترابي ليس بعيداً عن السوق المفتوح حيث تُباع تماثيل الضفادع الذهبية".

In translating the above-listed ST sentences, the modulation technique should be used. The modulation technique refers to "changing the form of information by presenting it from a different perspective" (Byrne 2012: 122). "The form of information is altered when translating from the source language to the target language and expressed from a different point of view, because a literal translation might result in something unfamiliar or unnatural for the target audience. This change occurs due to the linguistic and cultural differences between the source and target languages. In such cases, modulation is used as a method to ensure that the translation is more appropriate and fluent" (Giaber 2019: 120).

The following examples illustrate how modulation is applied to produce more appropriate Arabic translations of the above-listed English sentences:

In example 1, the students made an error by translating 'uncovered' in the source text as 'أزال' in the target text because the meaning of the sentence indicates that the scientist Anning discovered a new type of fossil that was previously unknown. Therefore, it would have been better to translate 'uncovered' as 'اكتشف' in the target text, as this reflects a more accurate meaning that fits the context of the text.

Additionally, the word 'إكتشف' is commonly used in scientific texts, especially when referring to finding something new. According to its meaning in the Oxford Word Power Dictionary (2006: 831), the word "uncovered" should be translated as "إكتشف" in the TT to convey its scientific meaning in this context so that it aligns with the linguistic and cultural structure of the TL. Therefore, the students should have translated the source text sentence 'When Anning uncovered another, nearly complete plesiosaur fossil, he was, once again, quickly informed of the finding, at which point he had to acknowledge that he'd been wrong.' as

"عندما إكتشف آنينغ حفريّة كاملة أخرى من نوع بليسيوصور ، تم إخباره فوراً بالإكتشاف، مما جعله يضطر إلى الإعتراف بخطئه".

Example 2: It is better to translate the verb 'lies' in the source text as 'يقع' instead of 'يكون' in the target language, as it refers to the location or place of the EVACC center. This is achieved by employing the modulation technique to make the target text more compatible with the context and style of the target language, which helps convey the intended meaning more accurately and clearly to the target audience. According to the Oxford Word Power Dictionary (2006, p. 452), the verb 'lie' in this context indicates the location of the center, so the ST verb 'lies' should be translated as 'يقع' instead of 'يكون' which conveys a more precise meaning in Arabic. Therefore, the ST sentence 'THE El Valle Amphibian Conservation Center, or EVACC (pronounced “ee-vac”), lies along a dirt road not far from the open-air market where the golden frog figurines are sold' should be translated as:

"يقع مركز الحفاظ على البرمائيات في الفالي ، او كما ينطق "إيفاك" ، على طريق ترابي قريب من السوق المفتوح حيث يتم عرض تماثيل الضفادع الذهبية للبيع".

Conclusion

The findings of this research confirm the hypothesis that students face considerable challenges in applying translation techniques in translating scientific texts. This study concluded that the eighth semester students, English Department, Zawyia University face difficulties in translating scientific texts and they

performed poorly in applying some translation techniques such as omission, addition, restructuring, modulation and transposition. This was due to their rely on literal translation, machine translation and general dictionaries. They also lack the necessary vocabulary, and misunderstand the meanings of some scientific terms. The study shows that the students need extensive courses on how to apply translation techniques in translating scientific texts and how to use the specialized terms in context. The study also shows that the students need to have practical lessons on how to translate scientific texts without using literal translation, general dictionaries or machine translation. Based on the findings of this study, the researcher suggests the following recommendations:

- a. It is important for the students to be aware of the grammatical structures of the source language and the target language.
- b. Students should take into consideration the lexical and syntactic differences between the ST and the TT.
- c. Students should be aware of how to use the specialized terms in their contexts.
- d. Students need to know how to apply the appropriate techniques of translation.

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