



# International Journal of Multidisciplinary Research and Growth Evaluation.

## Problems BA Students at Jadara University Face when Translating Scientific Texts from English into Arabic

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### Article Info

**ISSN (Online):** 2582-7138

**Impact Factor (RSIF):** 8.04

**Volume:** 07

**Issue:** 01

**Received:** 30-11-2025

**Accepted:** 01-01-2026

**Published:** 03-02-2026

**Page No:** 750-758

### Abstract

Translation plays a pivotal role in bridging languages, cultures, and fields of knowledge. Its importance is particularly evident in the scientific field, where accuracy, consistency, and contextual understanding are essential. Scientific translation goes beyond simply converting words; it requires a deep understanding of scientific content and specialized terminology, as well as the ability to communicate complex ideas. This study examines the translation experience of undergraduate students at Jadara University, focusing on the challenges they face in applying the principle of dynamic equivalence, which emphasizes conveying meaning and impact rather than just words. Through questionnaires, interviews, and short tests, students' approaches varied, with more proficient students tending to adopt contextual rather than literal translation. The study also highlights the gap between theory and practice in scientific translation education and proposes the integration of modern tools, such as terminological databases and validated software, to enhance students' practical skills. The findings underscore the necessity of incorporating more hands-on translation practice into the curriculum to bridge the gap between theoretical knowledge and real-world application. Additionally, increased exposure to authentic scientific texts can help students develop a more intuitive grasp of terminology and context. The study ultimately calls for a more dynamic and tool-supported approach to teaching scientific translation at the undergraduate level.

**Keywords:** Scientific Translation, Dynamic Equivalence, Scientific Translation Strategy, Scientific Translation Problem

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### 1. Introduction

Translation plays a vital role in bridging languages, cultures, and fields of knowledge. It is especially essential in the realm of science, where precision, consistency, and contextual accuracy are crucial. Scientific translation goes beyond simply converting words—it requires a deep understanding of the subject matter, specialized terminology, and the ability to convey complex ideas clearly. This is particularly true when dealing with terms derived from Latin and Greek, commonly found in medical and scientific disciplines. Scientific translation is the professional exercise of translating scientific writing into a second language with emphasis on precision, consistency, and clarity. Scientific translation is beyond normal linguistic skills; it requires in-depth understanding of scientific principle and scientific vocabulary in the specific area of translation. Scientific translation is mostly applied to papers such as research papers, lab reports, academic dissertations, patents, and technical manuals. One of the remarkable features of scientific translation is the use of standardized terminology so that meaning is not twisted and stays simple in any language. Scientific writing must be objective and specific. Scientific translation as per a specific discipline implies various kinds of technical terms. For example, biology uses terms such as "photosynthesis" and "genome," chemistry uses terms such as "catalyst" and "isotope," physics uses terms such as "entropy" and "quantum mechanics," and medical science uses terms such as "pathogen" and "radiology." A good scientific translation ensures that these terms are translated and interpreted accurately, preserving the original meaning and scientific value of the text.

At Jadara University, translation is more than a theoretical subject—it's a practical tool integrated into the academic journey. Students are encouraged to engage with different types of translation, especially in demanding fields like medicine, chemistry, engineering, law, and computer science. This exposure not only builds linguistic competence but also connects students with real-world challenges. Through classroom observations and interviews, it became evident that students vary widely in their translation approaches. While some focus on word-for-word translation, others—often the more proficient—embrace contextual translation, which is key to success in technical fields. However, challenges remain. Some students continue to rely heavily on dictionaries, sometimes at the expense of accuracy and context. This research sets out to explore how BA students at Jadara University navigate the world of scientific translation. It focuses on the challenges they encounter, particularly in applying the principle of dynamic equivalence—a concept championed by Eugene Nida that emphasizes conveying the intended meaning and effect of a source text rather than its exact words. This study examines the strategies students use and evaluates how effectively they apply them to produce accurate, clear, and culturally sensitive translations.

Jadara University students of translation exert great efforts in translating scientific texts. These students are, however, destined to encounter challenges that come with achieving dynamic equivalence between the target and source text, and communicating the intended meaning of the text without distorting the grammatical and scientific context. Dynamic equivalence is extremely important, where clarity and the right reaction from the reader is required (Nida, 1975)<sup>[14]</sup>. So, applying this principle in translating science makes special content communicated through clear and natural language to the Arabic reader without losing accuracy or specialized context of meaning.

The significance of this research lies in its focus on scientific translation, which serves as a vital bridge for transferring knowledge, disseminating research findings, and facilitating communication between experts across different languages and cultures. In an increasingly globalized world, accurate scientific translation plays a central role in the exchange of expertise in fields such as engineering, medicine, computer science, physics, and the natural sciences. Errors or lack of precision in translating scientific content can lead to serious misunderstandings, which may affect public safety, research outcomes, and technological development. This study is also practically significant because it examines the translation practices of BA students at Jadara University, shedding light on their ability to handle complex scientific texts and apply effective strategies in real-world contexts. By analyzing the students' translation methods, challenges, and learning experiences, the research provides valuable insights into how university-level translation programs are preparing students for professional practice. These insights can help improve curriculum design, teaching approaches, and assessment methods in translation departments. Furthermore, this research encourages educational institutions to adopt more applied, hands-on translation projects that align with labor

market needs. By fostering stronger links between academic training and practical application, universities can better equip students with the linguistic, cognitive, and technical skills necessary for success in the translation industry. In doing so, institutions like Jadara University can contribute to the development of qualified translators who can serve both local and international communities.

This study analyses the students' work in relation to some basic principles of exact scientific translation with the aim of revealing, as a consequence, the gap existing between theory and practice within scientific translation education. It also aims to provide practical recommendations for improving the method of teaching translation in academic settings to ensure that the graduates stand a chance of keeping pace with the professional market and academic circuits. In the face of rapidly advancing science and technology, the need for specialized translators is even greater; this is where the effort should go into making scientific translation curricula more responsive to the translation practice and its linguistic and cognitive challenges. In this regard, the importance of integrating scientific translation within an interactive learning environment is highlighted, whereby critical thinking can be fostered and students will be trained in modern tools, such as electronic terminology databases and certified translation software. Considering different cultural contexts for terminology is also a part of the translation process, especially when it comes to expressing scientific concepts whose denotations may vary from one culture to another. Hence, the making of scientific translators should in no way be restricted to the linguistic aspect, but it should also include knowledge of the field from and to which the translations are made and the target audience for whom these translations are made—their needs and expectations from the source. A good translator is an amalgam of scientific accuracy, cultural awareness, and willingness to work in varied contexts.

Against this background, the study sets out to explore the following key questions:

1. What are the challenges facing Jadara University students in translating scientific texts from English to Arabic?
2. What's the quality of translations provided by translation students?

Accordingly, the objectives of this research are:

1. To identify the most prominent challenges students, face when translating specialized scientific texts.
2. To study the extent to which students at Jadara University apply the concepts of dynamic equivalence in scientific translation based on Eugene Nida's theory.

By addressing these questions and objectives, this study aims to provide practical recommendations for improving the teaching of scientific translation in academic settings to ensure that graduates are equipped with the linguistic, cognitive, and technical skills required to meet both academic and professional standards in a rapidly evolving scientific and technological world.

## 2. Literature Review

### 2.1. Theoretical Framework

#### 2.1.1. Dynamic Equivalence Theory

This study adopts the dynamic equivalence theory. Eugene Nida developed the concept of dynamic equivalence as part of his efforts to standardize translation. This concept is based on conveying the effect of the source text to the reader in the target language. This model assumes that the translator may depart from literal translation in order to achieve the intended meaning and ease of understanding, especially in texts that require effective communication, such as religious, educational, and scientific texts (Nida, 1964) <sup>[1]</sup>.

Although dynamic equivalence has been associated with religious texts, Nida highlighted its importance in scientific translation as well, given its need for clarity and precision. This concept helps transcend literal translation, contributing to improved understanding of scientific texts among recipients, especially translation students.

Dynamic equivalence, a term introduced by Eugene Nida, emphasizes communicating the meaning, affects, and effects of a source text, rather than achieving a word-for-word rendition. The principal claim is that the reader should share the same response to the translation that they would share with the original text, even if the surface text differs from the source text in form. Advocates claim that this tactic is particularly useful for technical and scientific texts, where specific terminology must be understood in a specific conceptual and cultural frame, and where the target audience. For example, Arabic-speaking students or professionals need outputs that are natural, idiomatic, and contextually clear.

Commonly associated principles of dynamic equivalence:

- **Meaning over form:** focusing on sense, function and effect not exact wording or syntax.
- **Readability:** making translations that read as if they have been originally written in the target language, acceptable register and style.
- **Contextual fidelity:** considering cultural, disciplinary and contextual nuances and maintain these, so that reader sense and purposes are sustained.
- **Audience-centered approach:** making translation choices (terms, examples, explanations) based upon the target audience's prior knowledge and expectations.
- **Terminus diacritics:** using historical standardized terminology and consistent usage throughout the text to retain clarity and avoid ambiguity.

The study found that students' moves toward dynamic equivalence appeared to shift from a word-for-word translation to being contextualized in their interpretations for the students who were more proficient translators. The researchers pointed out that students with greater proficiency tended to compare emphasis on meaning and contextual appropriateness—consistent with Nida's focus on effect and naturalness—rather than being concerned about a literal correspondence. This aligns with broader findings in translation studies that demonstrate dynamic equivalence could allow for the preservation of scientific accuracy while increasing understandability for the target readership (Nida, 1975; Nida & Taber, 1982). However, the researchers also identified ongoing disconnects between theory and classroom

practice: students relied on dictionaries; appropriate domain-specific vocabulary was challenging; and articulating specific scientific relationships (e.g., relationships among processes, mechanisms, or measurements) inherent in a particular research project was a distinct challenge from reporting the findings in a readable way.

In their description of translation methods, Vinay and Darbelnet (1958/1995) introduce the concept of translating for sense through pragmatic equivalence, rather than literal equivalence, which relates to the dynamic approach when it comes to scientific discourse. In contemporary discourse, Christine House's dynamic equivalence and functionalist perspectives (House, 2015) focus on the social and functional aspects of translation, especially regarding how the choices of terms and discourse conventions shape reader expectations in the target culture. Ultimately, dynamic equivalence is most compelling when complemented by terminology databases, domain training, and practicing with authentic materials such as a scientific journal or textbook so learners can hinge on convention and conventionalizations in the target language. Practical implications for teaching and curriculum design include combining translating with authentic texts, using electronic terminology databases, and verifying software tools to help enforce consistent terminology use. The implications of Jadara University indicate a curriculum about practice-based competencies, exposure to real scientific texts, and assistance scaffolding students from theoretical considerations of dynamic equivalence to the decisions they make when translating in specific domains.

#### 2.1.2. Translation Strategies

There are many significant approaches to translation have been discussed in the literature. 1. Dynamic or functional equivalence was initially called by Nida (1975), and stresses either giving meaning and overall effect and not surface forms. The target is to have naturalness and eventual impact of the target reader. The second vision is closely linked, which is 2. functional equivalence and contextualization. This is the approach that Nida and Taber (1969) described as selecting expressions in the target language that produce the same communicative function in the and in the reader's response happens that parallels the form of the source language.

Cultural mediation has been emphasized by other theorists. Vinay and Darbelnet (1995) focus on pragmatic equivalence and cultural adaptation, using instrumentation such as adaptation, modulation and equivalence to keep sense and function across two languages. Newmark (1988) <sup>[9]</sup>, on the other hand, makes the proposal for 4. communicative translation which creates equivalents that commit to the communicative purpose of the source text while considering style, register, and audience expectations.

A recent contribution is House's (2015) descriptive and functional approach, which situates translation in the target culture and examines how readers understand the translated text, stressing that translation is a cross-cultural act with social repercussions. Practical strategies are also important in addition to theoretical models. For instance, terminology management and standardization—as noticed in the works of Schmitt (1999), which is a concrete example of how

terminology management is related to the discussions of Nida (1975) and House (2015), which support consistency and precision in specialized fields such as scientific translation. Finally, many of these approaches subtly emphasize the significance of readability-driven translation, where translation could be accessible and effective. As suggested by theories in Nida (1975) <sup>[14]</sup> and Newmark (1988) <sup>[9]</sup>, translators need to choose words, structures, examples, etc., guided by the reading norms, cognitive load, and expectations of the audience to make it easier for them to do so.

## 2.2. Related Studies

Several studies have addressed the importance and effectiveness of dynamic equivalence in translation, particularly in religious and scientific texts. Al-Awawdeh's (2018) study confirmed that the use of dynamic equivalence improves the comprehension of the translated text among Arab recipients, provided the translator masters the specialty and terminology used. "The use of dynamic equivalence in religious and scientific texts significantly improved comprehension among Arab readers, provided that translators had sufficient mastery of the subject matter and terminology." (Al-Awawdeh, 2018).

Hammad's (2021) study focused on the applications of Nida's theory in academic translation, noting that university students face difficulties in achieving semantic equivalence due to their reliance on literal translation and lack of adequate training. "University students struggle to achieve dynamic equivalence due to their reliance on literal translation and lack of proper training in functional approaches." (Hammad, 2021).

Smith and Jones' (2016) <sup>[3]</sup> study also indicated that using the dynamic equivalence model helped university students produce clearer and more accurate translations, particularly for concepts that lack a direct equivalent in the target language. "Student translations employing dynamic equivalence produced more accurate and comprehensible scientific texts, especially when no direct equivalents existed in the target language." (Smith & Jones, 2016, p. 53) <sup>[3]</sup>.

In the same context, Zhao's (2018) <sup>[5]</sup> study demonstrated that this model is an effective tool in translating cultural and scientific concepts, as it aims to clearly convey meaning to the target audience. "Dynamic equivalence is a powerful strategy for translating scientific and cultural concepts clearly to target audiences, especially when communicative clarity is the main goal." (Zhao, 2018, p. 68) <sup>[5]</sup>.

On the other hand, Yang Sigui's (2016) <sup>[4]</sup> study showed that Nida later modified the term "dynamic equivalence" to "functional equivalence" to avoid conceptual ambiguity, reflecting the evolution of his theory. "Nida later revised the term 'dynamic equivalence' to 'functional equivalence' to avoid conceptual confusion and better reflect the pragmatic focus of his model." (Yang, 2016, p. 7) <sup>[4]</sup>

The origin of this concept can be traced back to Nida's (1964) <sup>[1]</sup> book, "Toward a Science of Translation," in which he defined dynamic equivalence as "the closest natural equivalent to the source language message." Nida and Taber (1969) further reinforced this concept in their book, "The

Theory and Practice of Translation," emphasizing the importance of conveying the original message naturally in the target language to enhance reader comprehension. "A dynamic-equivalence translation aims at complete naturalness of expression, and tries to relate the receptor to modes of behavior relevant within the context of his own culture." (Nida & Taber, 1969, p. 12) <sup>[2]</sup> "Translation consists in reproducing in the receptor language the closest natural equivalent of the source-language message, first in meaning and second in style." (Nida, 1964, p. 159). Al Menoufy (2011) <sup>[15]</sup> discusses the challenges associated with dynamic equivalence, particularly its potential to lead translators to overstep the bounds of accurate translation in an effort to make the text sound natural in the target language. She highlights that "while dynamic equivalence can produce more natural and precise translations, it also carries the risk of distorting the original message if not applied carefully." Yu (2015) examines the application of dynamic cultural equivalence in translating business English. The study emphasizes the importance of considering the cultural context and the emotional impact on the target audience, suggesting that "dynamic equivalence can enhance the effectiveness of business communication by aligning the translation with the cultural norms and expectations of the target audience." Whissell (2012) <sup>[17]</sup> investigates the emotional consistency across different English translations of the Bible. Using the Dictionary of Affect in Language, she analyzes the emotional undertones of various translations and finds that despite small differences, "the translations are emotionally consistent, thereby demonstrating dynamic equivalence in conveying the same emotional effect to the reader". Robinson (2020) <sup>[18]</sup> reconsiders dynamic equivalence as a rhetorical construct, suggesting that "it is not merely about linguistic equivalence but involves aligning the rhetorical situations of the source and target texts". He incorporates Aristotle's modes of persuasion—logos, ethos, and pathos—to analyze the application of dynamic equivalence, particularly in the translation of sacred texts like the Bible and the Chinese Mengzi. Colas (2018) explores the challenges of translating jihadist concepts, such as "jihad" and "sharia," into English. He argues that "dynamic equivalence is crucial in accurately conveying the connotative meanings of these terms, as literal translations often fail to capture the intended impact". By applying dynamic equivalence, translators can provide a more accurate understanding of these concepts to the target audience.

## 3. Methodology

This section aims to provide an applied study of the concept of dynamic equivalence as stated in Eugene Nida's theory. This study was conducted by analyzing translations of specialized scientific texts from various fields, including medicine, physics, chemistry, computer science, and law, translated by a group of students in the Translation Department at Jadara University. These texts were carefully selected to reflect the diversity of terminology, conceptual structure, and cultural and linguistic challenges facing scientific translators.

**3.1. Research design:** This research uses a mixed-methods design that employs quantitative measures (short translation assignments, marker-based quality assessment) in combination with qualitative methods (semi-structured conversations with students and one maybe think-aloud category in terms of documenting their choices) to discover how and when students adhere to principles of dynamic-equivalence while translating scientific texts.

**3.2. Participants:** The participants will be a sample of undergraduate BA English Language and Translation students at Jadara University, sampled according to strata being, year of study and access to scientific translation previously.

### 3.3. Data collection instruments:

- Short translation assignments** - Participants will access passages from scientific texts available in English which will be translated into Arabic. They will be developing passages that challenge them to consider the meanings they are preserving, present alternative terminology, and consider the assessable readability.
- Questionnaires** - Items to understand students' self-beliefs about dynamic equivalence, self-proclaimed use of strategies, and confidence regarding field-specific terms.
- Interviews** - Semi-structured interviews to question students about their decision-making processes and the conditions of reference to alternative forms of knowledge, issues with field-specific terminology, and types of approaches to those decisions regarding balancing accuracy and readability.
- The short tests/tests of terminology** - There will be a series of vocabulary checks, and items that include a

items matching terminology (e.g. physics, chemistry, biology, etc.) to gauge how familiar students are with discipline-related vocabulary.

- Maybe:** think-aloud protocols for sample translations to tap into mental and cognitive processes as they first arise.

### 3.4. Data analysis:

- Quantitative:** Descriptive statistics and inferential comparisons (e.g., by proficiency level) on scores for translation quality, error types, and terminology accuracy.
- Qualitative:** Thematic analysis of interview transcripts and think-aloud data to recognize strategies for applying dynamic-equivalence principles, including instances of accommodations to meaning versus form on the basis of the dynamic equivalence principles.
- Instruments (particulars):** Rubrics for translation quality focused on meaning retention, term accuracy, readability/naturalness in Arabic, and audience expectations - Validated field-specific terminology databases or glossaries as potential resources for students to use - Standardized source texts, each containing the same technical terms, to allow comparisons across participants.

## 4. Results and Discussions

The practical side of this study revealed a number of important findings about how students at Jadara University apply the principle of dynamic equivalence when translating specialized scientific texts. These results offer a nuanced view of both the students' strengths and the areas where they still face challenges. Look at the following (table.1) to compare between the accuracy in translating the texts from English into Arabic.

Table 1

| Text                                      | Observation  | Analysis  |
|---|--|---|
| Medicine – How mRNA Vaccines Work         | The translation of "remains the most critical means" varies between: "تظل الوسيلة الأساسية" و"الوسيلة الأهم على الإطلاق".                        | Students who used phrases like: "الوسيلة الأكثر فاعلية في مواجهة الأمراض المعدية" were closer to the dynamic equivalence principle, fitting the informative tone. |
| Physics – Gauge Boson Mass Problem        | Students had difficulty translating terms like "gauge invariance" and "electroweak interaction".   | Using common Arabic scientific terms like: "ثبات القياس" و"التفاعل الكهروضعيف" showed functional awareness, but inconsistency affected clarity.                   |
| Chemistry – Acid-Base Reaction            | Most translations were terminologically accurate, but some lacked logical sentence flow.   | Students who used direct educational language (e.g., "عند إزالة" "أيون الهيدروجين") achieved better dynamic equivalence by aiding comprehension.                  |
| Computer Science – Reinforcement Learning | Literal translation of "super-human level" as "مستوى فوق البشري" weakened the meaning, while "exceeded human capabilities" was more appropriate. | Descriptive rather than literal approaches resulted in translations more aligned with the original text's spirit.   |
| Law – Donoghue v. Stevenson Case          | This legal text posed the most difficulty due to complex syntax and dense terminology.   | Students who restructured long sentences into clear, short Arabic ones preserved legal meaning and achieved dynamic equivalence.                                  |

Table 1 summarizes the main observations and analytical comments for each source text. This table highlights patterns in the translation strategies employed by students, as well as the common issues faced across different fields.

The applied study yielded a set of important results that reflect the students' understanding of the principle of dynamic equivalence and their application of it when translating specialized scientific texts, according to the next figure:

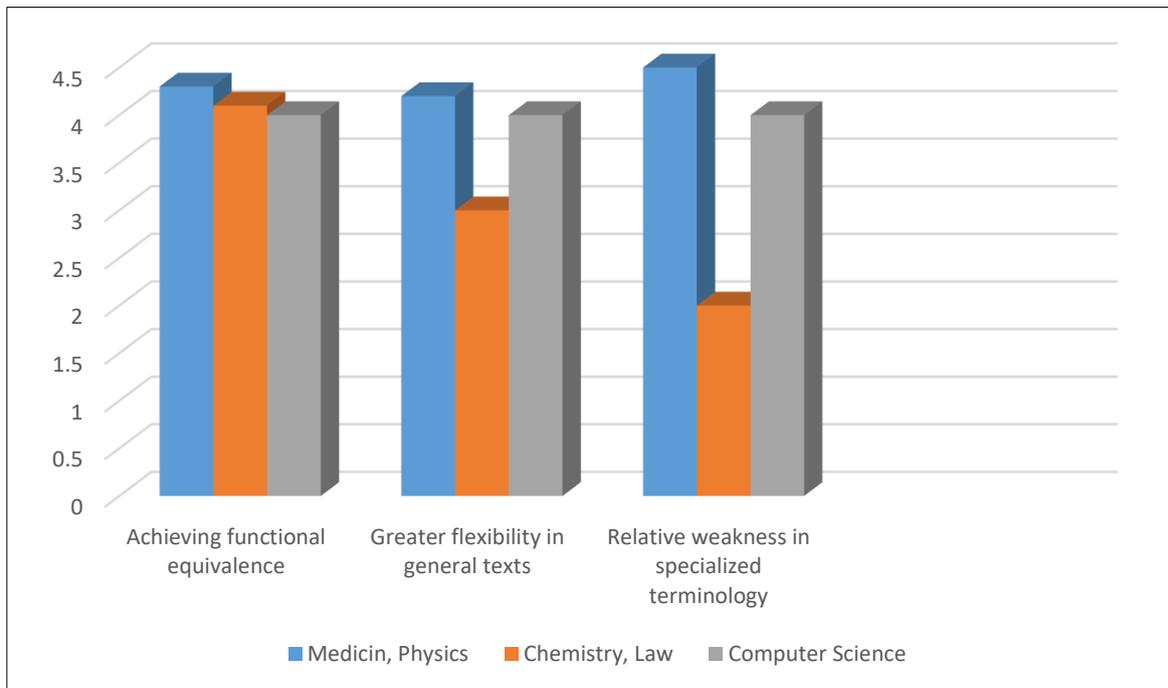


Fig 1:

- Varying Levels of Success in Achieving Functional Equivalence:** A noteworthy number of students demonstrated the ability to move beyond literal translation. Their work reflected clarity, fluency, and a strong grasp of the intended meaning of the original text—an approach that aligns well with Nida’s idea of creating an equivalent reader response in the target language.
- Gaps in Mastery of Specialized Terminology:** Certain fields—such as physics and law—proved more difficult. Weaknesses in specialized vocabulary became apparent due to limited exposure and a lack of consistent practice with highly technical texts.
- Greater Flexibility in Familiar Scientific Domains:** Texts related to medicine, chemistry, and computer science were generally handled with more ease, and students were able to convey both message and intent effectively.

According to Nida (1964), a successful translation is one that “conveys in the target language the closest natural equivalent to the source language message, first in meaning and second in style.” The following table presents a comparative analysis of the students’ translations, demonstrating their success in applying the principle of dynamic equivalence across different text types:

Table 2

| Text Type    | Translation Example   | Dynamic Equivalence Success Score | Analytical Notes  |
|--------------|---|-----------------------------------|---|
| Medical Text | «الوسيلة الأهم على الإطلاق» بدلاً من «تظل الوسيلة الأساسية» | High                              | The translation maintained the functional tone and emphasis of the original text. |
| Legal text   | «قضية الضرر ضد المصنع»                                      | Low                               | The precise legal meaning was lost due to the literal translation.                |
|              | Reorganizing long sentences to suit the Arabic legal style  | Medium to High                    | Successfully keeping up with the legal drafting style in Arabic.                  |

These examples demonstrate that, according to the principle of dynamic equivalence, successful translation depends on contextual awareness and the translator's flexibility more than just linguistic knowledge.

The results clearly reflect the main research objective: assessing how well students apply dynamic equivalence. Those with structured guidance showed better results in terms of clarity, terminology choice, and reader-oriented translation, supporting the hypothesis that dynamic equivalence improves scientific translation outcomes.

The findings of this study provide encouraging evidence that many translation students at Jadara University are successfully applying the principle of dynamic equivalence. However, their performance varied depending on the complexity of the text and their familiarity with the subject.

**Students Demonstrated Strong Potential—Especially in Familiar Domains:** In fields like medicine and chemistry, students performed well, producing clear and contextually appropriate translations. This supports Nida’s theory that successful translation evokes a similar response in the target reader.

**Challenges Emerged in More Technical or Abstract Fields:** Fields such as physics and law presented more difficulty. In these cases, students often defaulted to literal translation due to unfamiliarity with the content, leading to inaccuracies.

**The Role of Training and Feedback in Student Growth:** Students who engaged in interactive learning

environments—such as group work and instructor feedback—showed greater ability to apply dynamic equivalence effectively.

Generally, dynamic equivalence proves effective when

paired with domain-specific knowledge and practical training. While many students made strong progress, ongoing support is needed to help them apply these skills consistently across various fields.

Table 3

| Problems in Scientific Translation with Examples |   |  |  |
|--|---|--|--|
| Problem  | Source Example (English)  | Incorrect / Literal Translation (English)  | Correct Translation (Arabic)   |
| 1. Over-reliance on dictionary                   | pathogen  | germ   | ممرض   |
| 2. Inconsistency in technical terms              | catalyst  | katalyst / catalyst (inconsistently used)  | محفز   |
| 3. Literal vs. readable rendering                | The enzyme catalyses the reaction by decreasing the activation energy.              | The enzyme catalyses the reaction by decreasing the activation energy. (rigid literal) | عبر التفاعل تسريع على الإنزيم يعمل التنشيط طاقة خفض                  |
| 4. Loss of nuance in methodology                 | The apparatus was connected using a three-valve system to measure pressure changes. | The device was connected with three valves to measure changes. (oversimplified, vague) | ثلاثي نظام باستخدام الجهاز توصيل تم الضغط في التغيرات لقياس الصمامات |
| 5. Cause–effect representation                   | If the temperature increases, the reaction rate will rise.                          | If the temperature increases, then the reaction rate is rising. (awkward literal)      | معدل يزداد الحرارة درجة ارتفعت إذا التفاعل                           |
| 6. Gap between theory and practice               | Photosynthesis produces glucose.  | Word-for-word: Photosynthesis produces glucose. (without contextual clarity)           | الجلوكوز تنتج الضوئي البناء عملية                                    |
| 7. Lack of terminology tools                     | glucose   | Different renderings: “sugar of grape / glucose”                                       | غلوكوز   |
| 8. Cultural/contextual issues                    | solvent   | solution   | مذيب   |

#### 4.1. Summary of Problems

##### 1. Over-reliance on dictionary/loss of context

**Example:** pathogen → translated as “germ” (incorrect)

**Correct:** ممرض

**Summary:** Students often rely on dictionary meanings without considering specialized usage, which can reduce terminological precision in scientific texts.

##### 2. Inconsistency in technical terms

**Example:** catalyst → “katalyst” or inconsistent “catalyst”

**Correct:** محفز

**Summary:** Lack of terminology standardization leads to inconsistent translations, disrupting text cohesion and clarity.

##### 3. Literal vs. readable rendering

**Example:** The enzyme catalyzes the reaction by decreasing the activation energy.

**Incorrect translation:** literal copy, awkward structure

**Correct translation:** يعمل الإنزيم على تسريع التفاعل عبر خفض طاقة التنشيط

**Summary:** Literal translation may preserve grammar but reduces readability and clarity of scientific relations.

##### 4. Loss of nuance in methodology

**Example:** The apparatus was connected using a three-valve system to measure pressure changes.

**Incorrect translation:** fragmented or oversimplified phrases

**Correct translation:** تم توصيل الجهاز باستخدام نظام ثلاثي الصمامات لقياس التغيرات في الضغط

**Summary:** Complex experimental descriptions often lose detail when translated word-for-word, creating ambiguity in procedures.

##### 5. Cause–effect representation

**Example:** If the temperature increases, the reaction rate will rise.

**Incorrect translation:** awkward literal “then the reaction rate is rising”

**Correct translation:** إذا ارتفعت درجة الحرارة يزداد معدل التفاعل

**Summary:** English conditional logic may be misrepresented in Arabic, affecting the clarity of experimental reasoning.

##### 6. Gap between theory and classroom practice

**Example:** Photosynthesis produces glucose.

**Incorrect translation:** literal word-for-word without contextual adaptation

**Correct translation:** عملية البناء الضوئي تنتج الجلوكوز

**Summary:** Students often revert to literal translation despite theoretical instruction on dynamic equivalence.

##### 7. Lack of standardized terminology tools

**Example:** glucose → “glucose” or “sugar of grape” inconsistently

**Correct translation:** غلوكوز

**Summary:** Limited use of glossaries or databases causes inconsistent terminology and reduces professional accuracy.

##### 8. Cultural and contextual challenges

**Example:** solvent → translated as “solution” (misleading)

**Correct translation:** مذيب

**Summary:** Cultural or regional differences in terminology may require adaptation to ensure accurate understanding for the Arabic audience.

## 5. Conclusion

This study confirmed the value of dynamic equivalence as both a theory and a practical tool for translation students. Those who adopted this approach moved toward clearer, more accurate translations, especially in general scientific contexts. While challenges remain in specialized fields, the model proved effective in improving both translation quality and cultural sensitivity. One of the most significant findings of the study is that applying tactical equivalence in practical training helps students enhance their translation skills. Through interaction with real texts, students gain a deeper understanding of context beyond just the literal meaning. This approach allows for learning adaptive textually and engaging effectively with the target audience. Linguistically, the study also found that understanding chemical collocations significantly improves students' abilities. This is because it requires them to analyze the original text for advanced scientific options, enabling them to select a specific specialization before making informed choices. This process encourages critical thinking, analysis, and the development of advanced awareness. Despite these advancements, the study concluded that applying dynamic equivalence in technical or specialized fields still presents challenges. Such fields often demand terminology and knowledge that cannot solely be derived from semantic options, highlighting the need for collaborative hybrid models that combine dynamic equivalence with terminological precision.

Moreover, the study highlights the importance of continuous exposure to authentic translation scenarios. When students engage with real-world texts that require dynamic problem-solving, they begin to internalize the flexible strategies needed for effective translation. This hands-on experience fosters not only linguistic accuracy but also professional confidence, as learners become more adept at making informed decisions in diverse contexts.

Finally, the research suggests that future curricula should place greater emphasis on interdisciplinary collaboration. By integrating knowledge from subject-matter experts in fields like chemistry, medicine, or law, translation programs can bridge the gap between linguistic theory and domain-specific practice. This hybrid approach would equip students with the tools necessary to navigate complex texts while maintaining cultural nuance and communicative clarity.

This study confirms that dynamic equivalence is not only theoretically sound but practically effective, particularly in helping student translators improve clarity and communication. When students are trained to focus on meaning and context, rather than just words, their translations become more accurate and accessible. As a researcher, I believe that integrating this approach into university programs is essential for developing translators who can handle both the linguistic and cultural challenges.

## 6. Recommendations

1. **Integrate dynamic equivalence into practical translation courses:** Dynamic equivalence should be embedded in hands-on training to develop students' awareness of meaning and context in translation.
2. **Provide field-specific training in scientific translation:** Students should engage with texts from medicine, law, and engineering to improve familiarity with technical language.
3. **Develop collaborative workshops with subject-matter experts:** Workshops can help students grasp

domain-specific meanings and reduce reliance on literal translation.

4. **Strengthen research skills and use of reliable resources:** Training in terminological research and the use of trusted dictionaries and databases is crucial for high-quality scientific translation.

To improve students' scientific translation competence, two recommendations are provided. First, instructors should stress to students to develop strategies for when to apply the dynamic-equivalence approach that emphasizes meaning, versus when form is more important for providing an accurate translation such as legal, regulatory or definition contexts. Second, it is useful to provide feedback loops, where students analyzed their translations against published translations or other expert products, so that students can calibrate comparisons on meaning, tone, and appropriateness for audience, with a stress on accuracy and communication.

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#### **How to Cite This Article**

Alshunnag MB, Melhem B. Problems BA students at Jadara University face when translating scientific texts from English into Arabic. *Int J Multidiscip Res Growth Eval*. 2026;7(1):750–758.

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