Artificial Intelligence in Education: Harnessing Its Power as a Valuable Tool, Not an Adversary

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ABSTRACT

Despite its controversial nature, machine translation (MT) has been increasingly integrated into learning in the past decade. This controversy arises from two different beliefs. While some believe that MT negatively impacts students’ language proficiency, others argue that it allows students to stay abreast of technological advancements. Despite the numerous risks associated with the unstoppable development and irresistible use of MT, it is imperative to explore appropriate integration methods instead of outrightly banning its use in learning the translation practice. Consequently, this article examines existing research on methods of using MT in classroom learning and highlights its strengths and limitations. The article explores pedagogical solutions to harness the capabilities of MT and proposes a novel approach for the practical and efficient utilization of GNMT in translation-learning classroom. The findings propose a novel strategy for optimizing the efficacy of GNMT tools in the context of classroom learning. Also, they emphasize the importance of integrating MT tools in classroom and to the curriculum design as a fast-developed technology tool.

KEYWORDS
GNMT, pedagogy, quality translation assessment, SPSS, translation-learning

INTRODUCTION

Artificial intelligence (AI) has made its mark on every facet of our everyday existence, leaving no aspect untouched. In the realm of Machine Translation, Google Neural Machine Translation (GNMT) stands out among the various tools, gaining significant recognition. As has been already witnessed, GNMT, among other machine translation tools, continuously evolves to facilitate even better and more efficient learning and language teaching, making the work easier for teachers and learners. The acceptability of the concept has improved, whereas it would have been heavily criticized in the past.

The increased usage of internet-connected devices among students has sparked a growing interest in researching the implications of their use, particularly with tools like GNMT, which is the most
widely used type of machine translation. In addition to its popularity among students, Google Translate has consistently advanced its technology, including implementing GNMT in 2016 (Bahri & Mahadi, 2020). It continues to undergo upgrades based on user query data, further enhancing its capabilities. This shift from utilizing Statistical Machine Translation (SMT) to using artificial neural networks in the recently discovered Neural Machine Translation (NMT) has improved translation accuracy, speed, and efficiency (Poibeau, 2017). In multiple studies, MT has been described as using specific software to translate text between various languages as desired (Qun & Xiaojun, 2015). Compared to the initially used technology, the most recent NMT has been verified to produce the desired output more efficiently and faster. Furthermore, it has demonstrated greater accuracy in translation, supported by sufficient databases (Bahri & Mahadi, 2020; Poibeau, 2017).

There are objections to the use of MT for several reasons. The first and most common assumption suggests that students will not gain as much knowledge or proficiency in a language when using MT. For example, in mathematics, teachers should not introduce their students to using calculators before they can master the basic concepts in calculations. A student would not derive any educational value if they merely used a search engine to find and write down the answer to a math problem without actively working on it, which applies to learning translation practice. There is a difference in learning when one writes a sentence and looks up the translation of the same sentence compared to when one produces the sentence and then translates it. Instructors in different languages often look for the ability to write in the target language and assess students’ ability to translate from one language into another.

This paper aims to explore mindful approaches to employing GNMT effectively to improve students’ abilities in translation. It emphasizes its usefulness for students by exploring its potential in learning the practice of translation. This research highlights the strengths and limitations of using MT in translation-learning classrooms and attempts to answer the following questions:

1. How should students of translation utilize GNMT effectively in translation-learning classroom?
2. What outcomes can be anticipated from employing different approaches to learning translation through GNMT?

Two hypotheses can be derived from the first research question; each of which refers to a different translation approach. The first relates to the conventional approach employed by students that includes pre-editing and post-editing, whereas the second relates to a comprehensive meticulous approach in which students employ human translation and make multi-edits in applying GNMT to develop their performance:

1. \( H_1: \mu_{\text{PreB}} \neq \mu_{\text{PostB}} \) (There is significant difference between pre- and post- applying a conventional approach to learning translation through GNMT among Group A).
2. \( H_2: \mu_{\text{PreA}} \neq \mu_{\text{PostA}} \) (There is significant difference between pre- and post- applying a comprehensive meticulous approach to learning translation through GNMT among Group B).

For the second research question, it is hypothesized that both groups will show improvements in translation abilities, but Group B will exhibit a more significant improvement compared to Group A:

1. \( H_3: \mu_\text{A} \neq \mu_\text{B} \) (There is significant improvement in translation abilities between Group A and Group B).

By addressing these research questions and testing the associated hypotheses, this study contributes to researchers’ understanding of effective strategies for integrating GNMT into translation education. The findings will benefit translation instructors and curriculum designers in incorporating effective approaches to teaching translation.
It is important to highlight the definitions of key concepts in this research context before embarking on this study. The concept ‘Translation-learning classroom’ refers to the dynamic process of translation within classroom settings. The concept ‘conventional method/approach’ refers to students using machine translation tools/engines effectively and performing the necessary pre-editing and post-editing. Lastly, the concepts ‘comprehensive meticulous approach and proposed approach’ are used interchangeably to refer to the author’s newly suggested holistic approach/method for effective utilization of GNMT in translation-learning classrooms. This approach transcends traditional practices by incorporating additional stages into the overall process. It includes undertaking a human translation task, utilizing MT, performing pre-editing and post-editing, conducting comparisons at the sentence level, making error analysis, and engaging in in-depth class discussions.

**LITERATURE REVIEW**

While researching the pros and cons of using machine translation in a classroom, Dorothy Zemach (2021) observed that some teachers fully embrace the technology while many others still hesitate to adopt it. She further noted that most of these hesitant teachers preferred to have their students write and communicate in the target language in class.

The MT tool has been used for an extended period since the beginning of technological advancements. In the initial period when the technologies were invented, there was significant resistance and hesitation from learners and instructors against their use. Learners hesitated to adopt the technology for various reasons: lack of awareness, insufficient skills to utilize it effectively, and fear of ridicule from peers and instructors. In recent times, however, the utilization of MT has intensified due to increased awareness and overall acceptance.

Research has increasingly shown widespread use of MT in classroom learning (Bourdais & Guichon, 2020; O’Neill, 2019a, 2019b; Tsai, 2022). Studies investigating the usage of these technologies have found that students employed MT in translation-learning to search for vocabulary, construct sentences, write, and counter-check individual assignments (Bahri & Mahadi, 2020; Bourdais & Guichon, 2020; O’Neill, 2019a, 2019b). One challenge reported by students regarding their experiences was a lack of confidence in the tools they used (Bahri & Mahadi, 2020; O’Neill, 2019a). Despite the heightened concerns regarding the accuracy of the tools, research consistently shows a gradual increase in the use of MT tools (Lee, 2022; O’Neill, 2019b).

Many instructors have been skeptical about using MT in classrooms. These hesitant instructors often tended to ban or limit the use of MT in translation-learning classrooms (Faber & Turrero Garcia, 2020; Hellmich & Vinall, 2021).

Moreover, many studies suggested pedagogical recommendations to the instructors who approached the technology cautiously (Ducar & Houk, 2018; Jiménez-Crespo, 2017; Klekovkina & Denié-Higney, 2022; Xiao, 2021). The suggested alternatives include using other activities, pre-editing and post-editing, and integrating additional online resources into the translation process. They concluded that as MT continuously improves and reduces errors, it is appropriate to lift the bans imposed on its use and consider the suggestions regarding its utility.

**MT in Classroom Learning: To Use or Not to Use**

Many studies (Stapleton & Kin, 2019; Xinjie & Yu, 2022) indicated that some instructors held a positive outlook on the technology and, as a result, integrated it to a certain extent. These studies assert that the use of MT might be inevitable, making it the most effective way to facilitate learning. On the other hand, other studies highlighted several concerns to the use of MT in classroom learning such as the software’s poor quality and accuracy, which posed challenges for practical use (Jolley & Maimone, 2022; Stapleton & Kin, 2019).

Most of the studies addressing the field of MT in translation-learning have primarily focused on learners’ primary perceptions. Studies included in this literature review are based on empirical
data primarily obtained through interviews, self-reports, and questionnaires. Some studies were also conducted through classroom observations and screen-recorded data (Fredholm, 2019; Knospe et al., 2019; Tsai, 2022). The gathered information included the frequency and methods of learners’ use and the reasons behind their use.

Some studies (Bahri & Mahadi, 2020; Eriksson, 2021) found that many instructors disapproved MT in classroom learning, believing it negatively impacted the students. Others (Groves & Mundt, 2021; Niño, 2020) indicated that when translating text automatically from one language to another, the MT software has been convenient. Significant alterations have been made to the software over time, resulting in improved usability and ease of understanding. Therefore, the reported efficiency is attributed to the introduction of many different versions. An illustrative example of such beneficial versions is the introduction of deep learning for the Google Translate software in 2016 (Wu et al., 2016). Klekovkina and Denié-Higney (2022) and Wu et al. (2016), when investigating the contribution of the versions, noted that they are beneficial not only for students but also for instructors.

Enriquez Raido & Sánchez Torrón (2020) conducted research on L1 Chinese ESL learners. For the study, 124 participants were required to complete the 5-point Likert scale questionnaire regarding their view of MT in L2 writing. On average, 3.8% of the participants agreed that they benefited from using MT for linguistic items, and 3.7% of the participants believed that using MT enhanced students’ English translation. Most participants expressed their knowledge of the importance of using the MT technology in translation-learning.

Niño (2020) conducted a study on students’ perception of the written and oral output of the tool. As shown by the study, 60% of the participants believed in the role of MT in different tasks. From the analysis, it was discovered that over 60% of the participants agreed on the positive impact of technology on their learning. Despite learners overwhelmingly perceiving MT positively, there were some adverse reports on the roles played by MT. The study conducted by Niño (2020) showed a reduced acceptance of the output produced by the software. Around 40% of the participants described the output as not very useful, indicating challenges in comprehending it. Therefore, some participants suggested that the software could be considered useful only in specific circumstances and not in others.

According to numerous studies, instructors have not fully embraced the use of MT technology in language learning due to the persistent challenge it poses: some students cannot independently learn when using MT (Briggs, 2018; Hellmich & Vinall, 2021). In addition to the reluctance to learn observed in both students and instructors, reports are suggesting that students tend to cheat more when using MT compared to other learning systems (Eriksson, 2021; Hellmich & Vinall, 2021).

Considering that some instructors show interest in using the tools but lack sufficient knowledge of their integration, research has been conducted to provide suggestions for enhancing efficiency in their pedagogical implementation (Paterson, 2023). One suggestion is to integrate various translation activities when utilizing the technology, such as pre-editing and post-editing classroom activities (Jiménez-Crespo, 2017; Olkhovska & Frolova, 2020). Some of the other suggestions listed included the integration of other pedagogical suggestions, including the introduction of the technology as support to unassisted learning where additional online resources could be used instead of using the technology alone (Ducar & Houk, 2018; O’Neill, 2019b).

These suggestions are crucial in a society where technology adoption is rapidly growing, and it is no longer practical to exclude users. Instead, the focus should be on integrating the technology to benefit all users. Further studies are required, however, to inform how students use the technology and its positive and negative effects, which would thereby lead to more comprehensive suggestions on its pedagogical use.

HOW MIGHT MT AFFECT LANGUAGE LEARNING?

According to various publications discussing the practicality of MT, it is effective for translating texts by identifying, correcting, and editing errors, thereby improving comprehension of the target language.
Several individuals have been recognized as pioneers of the MT learning approach, including French (1991), Richmond, (1994) and Somers (2001, 2003). These individuals have been recognized as leading experts in rectifying erroneous MT outputs (Somers et al., 2006). Richmond (1994) is renowned as the first researcher to demonstrate the connection between MT and second language acquisition (SLA) theory. He proposed various designs, such as pre-editing and back-translation, which promote comparison across different linguistics. Richmond (1994) further suggested that the integration of such activities is essential in the maximization of the processing of inputs and the increment of attention among the students. In an argument concerning post-editing activities, Belam (2002) proposed that learners perform detailed analyses of source and target texts for improved understanding. Other recent studies (Jolley & Maimone, 2022; Valijärvi & Tarsoly, 2019) further concluded that using methods other than MT technology encourages output manipulation and negotiation of meaning. Another study by Lee (2020) provided evidence of the benefits of using MT in pedagogy.

On that basis, there is a commonality in the findings of studies that explores the impact of MT assistance on learning. These studies have shown that learners who receive MT support demonstrate increased attention, improved metalinguistic awareness, and enhanced development of L2 knowledge. Moreover, certain studies have more explicitly investigated the language gains facilitated by MT software and activities. Many studies find using MT in the classroom unhelpful as it can disrupt language learning. Furthermore, some proponents assert that MT can yield benefits in both translation and language learning.

This research will examine GNMT as a learning tool in the classroom, emphasize the associated advantages, and propose methods to integrate technological tools into translation students’ curricula. Such integration aims to enhance the process of translation-learning and, thus, improve the quality of translation outputs.

However, the texts written by learners using MT tools do not closely correlate with the knowledge they have acquired, as these texts do not rely on their resources. When relying on these samples, determining if the new language has been acquired as intended is challenging. Therefore, this shortcoming raises questions about the most effective way for instructors to support using MT and determine the appropriate response to this technology.

Generally, the existing literature exploring the potential benefits of utilizing MT in translation courses has not yielded substantial outcomes but has focused on various aspects, including enhancing metalinguistic knowledge and improving performance in translation and written L2 tasks. However, it is yet to be proven whether the use of GNMT leads to improved performance in translation among students. Considering this, it holds significance to undertake this research aiming at gaining a deeper comprehension of the specific impacts of utilizing machine translation. Additionally, it is crucial to formulate and evaluate suggestions that can optimize its efficacy in practical settings using different approaches.

TRANSLATION QUALITY ASSESSMENT IN THE FIELD OF TRANSLATION STUDIES

The assessment of the quality of translation is crucial. According to House (2015), “translation quality assessment can be considered central to any theory of translation” (p. 1). However, researching TQA in translation studies poses challenges due to the difficulty in assessing translated texts (Modarresi & Ghoreyshi, 2018; Williams, 2009) and “the main problem lies in determining how to express and measure the quality of a translation” (Gharacheh, 2005, p. 20). To address this issue, translation theorists in the past decade have introduced various approaches. A comprehensive study conducted by Galán-Mañas and Hurtado Albir (2015) and the work of Hurtado Albir (2015) have resulted in the development of models and rubrics.

Rubrics play a vital role in the comprehensive assessment of translations. They aim to create high-quality models and transform them into metrics that meticulously evaluate the components,
contributing to overall quality. Notably, as pointed out by Stevens and Levi (2004), a rubric serves as an indispensable scoring tool that precisely lays out the specific expectations for a given assignment. Rubrics clearly differentiate between acceptable and unacceptable performance levels by providing meticulous and comprehensive descriptions. Furthermore, Riazi (2003) emphasizes that rubrics foster unbiased and objective assessments and serve as a cornerstone for nurturing reflection, facilitating peer review, and enabling effective self-assessment.

This research adopts the Translation Competence Model (TCM) developed by Hurtado Albir (2015). It is an evaluation method that assesses translation competence and the underlying abilities and skills required for successful translation. Figure 1 presents the model and its three main components of knowledge, skills, and strategies (Hurtado Albir, 2015).

Hurtado Albir’s TCM provides a valuable framework for researchers, educators, and practitioners to better understand the multifaceted nature of translation competence and guide the assessment and training of translators.

The TCM recognizes that translation competence is not a fixed attribute but rather develops and evolves over time through training, experience, and reflective practice. It emphasizes the importance of ongoing professional development and continuous improvement in translation competence (Hurtado Albir, 2015). This approach considers the detrimental impact of errors and the beneficial effect of solutions to translation problems on the overall quality of the translation. Derived from Hurtado Albir’s work (2015) and rooted in error analysis, this method categorizes potential mistakes into distinct groups. The first group comprises inappropriate renderings that hinder the comprehension of the source text. It further divides these renderings into eight categories: countersense (i.e., mistranslation), faux sense (i.e., incorrect meaning), non-sense (i.e., nonsensical), addition, omission, unresolved extra-linguistic references, loss of meaning, and inappropriate linguistic variation (such as register, style, dialect, etc.). The second group encompasses inappropriate renderings that impact expression in the target language, categorized into five areas: spelling, grammar, lexical items, text, and style. The third group involves inadequate renderings that affect the transmission of the main or secondary functions of the source text.

Figure 1. Translation competence model
Each category differentiates between serious errors (worth -2 points) and minor errors (worth -1 point), with the assigned value reflecting the corrector’s judgment of the negative impact of each error on the translation output. These principles are to be applied to various texts intended for translation in diverse language pairs. Additionally, there is a fourth category that acknowledges positive contributions, awarding points (+1 point or +2 points) for good or exceptionally good solutions to translation problems. To facilitate comprehension of Hurtado Albir’s evaluation method (2015), Figure 1 above presents the different categories clearly.

SIGNIFICANCE OF THIS STUDY

The current study explores a way to incorporate GNMT effectively into the curriculum. This study will contribute to the academic literature on MT’s effectiveness in classroom learning. The study results will provide valuable insights into the role of MT in enhancing students’ performance in translation. Once instructors acquire this knowledge, they will be better equipped to determine the appropriate level of MT integration in the learning process.

METHODOLOGY

This study adopted a mixed research approach by incorporating both qualitative and quantitative data analysis. By conducting an experiment, the results will be analyzed qualitatively to derive quantitative data.

Participants of the Study

This study examined 50 BA students majoring in Arabic-English Translation while undertaking a computer-assisted translation course. The participants were 70% females and 30% males from the third and fourth years. The computer-aided translation course is exclusively available to third- and fourth-year students per the university’s curriculum. This ensures that only students who have completed all language and basic and advanced translation courses are eligible to enroll in this course.

Data Collection

Two overarching categories, online and offline processes, are employed to collect data from the translation process (Krings, 2005). The first category, online processes, primarily focuses on the documentation’s role in influencing the subjects’ task performance. Data collection from various online sites involved observing behavior and extracting verbal data through talking and thinking aloud (Krings, 2005). The offline processes encompass the steps taken by investigators to collect data after task completion. This category includes product analysis, which involves comparing similar subjects and their results (Krings, 2005). This research adopted offline processes to examine translations produced by the students under study and compared their results for the same assignments.

The study involved two groups of BA students, labeled as Group A and Group B, who underwent a pretest exam to assess their translation abilities prior to the experiment. Both groups received, throughout the course, training in conducting pre-editing and post-editing for machine translation (MT). However, the methodology differed between the two groups. Group A received instructions to utilize Machine Translation (MT) for translation and subsequently engaged in pre-editing and post-editing, following the guidance provided by the instructor during classroom training. It is worth noting that the researcher based the Group A learning method on how students were already using MT when working on assignments outside the classroom.

On the other hand, Group B followed a more comprehensive meticulous approach that involved performing human translations, utilizing MT as a point of reference, conducting sentence-by-sentence comparisons with the MT output, and subsequently engaging in post-editing to refine and finalize
the translations. It is worth noting that this approach resonates with student-centered active learning theory. It emphasizes the value of encouraging active student participation in the learning process so that students become more self-directed learners, actively seek solutions, and improve their understanding of translation nuances. According to Bonwell and Eison (1991), student-centered active learning theory promotes higher-order cognitive processes, fosters problem-solving abilities, and encourages meaningful engagement with the subject matter.

In order to provide a comprehensive insight into the progression of our experiment, we present a small sample of students’ work that was gathered throughout the duration of the study. This sample is included in Appendix A: “Small Sample of Students’ Work Throughout the Experiment,” allowing readers to observe firsthand the outcomes of our instructional approach.

**Data Analysis**

The pre-tests and post-tests were scored, based on Hurtado Albir’s evaluation model (2015), to assess the content’s accuracy, clarity, vocabulary correctness, spelling errors, syntax, etc. The model takes into account how errors affect the translation’s overall quality when rating student translations. Three categories of errors exist:

1. The eight categories of unsuitable renderings: mistranslation, erroneous meaning, nonsensical translation, addition, omission, unresolved allusions, loss of meaning, inappropriate linguistic variation, and inappropriate renderings that make it difficult to understand the source text.
2. Five categories of improper translations that affect expression in the target language include spelling, grammar, lexical items, text, and style.
3. Rendering errors that interfere with the conveyance of the primary or supporting purposes of the original text.

For the purpose of evaluating each error’s impact on the translation, a value of -2 points is given for major errors and a value of -1 point is given for minor ones. Additionally, for outstanding or particularly good solutions to translation challenges, +1 or +2 points are given in recognition of constructive efforts. This evaluation technique was used throughout the study to measure students’ translation proficiency on a variety of texts. The evaluation procedure was made easier and the students’ translation skills were better understood because of the model’s clear categorization and guiding principles.

In the assessment, the researcher tried to avoid conflating variables to ensure the validity of the results. First, students, in their pre-tests and post-tests, did not have access to spell-checking tools or online MT. Second, the tests were assessed by one evaluator: the researcher of this paper, who is also the course instructor. She holds a PhD in the field of translation studies and possesses advanced knowledge and experience in assessing translations. With 10 years of expertise in the field, the instructor’s evaluation provides a comprehensive and authoritative assessment of the tests.

The scores were then analyzed using SPSS software to examine the mean differences between the two groups. The purpose was to determine whether there were statistically significant differences in students’ marks within each group. The paired-sample *t* test was used as it aims to compare the means of two related groups under different conditions. As for the mean differences between the two groups, independent sample *t* test was used to examine if the improvement achieved within each group differs.

It is important to highlight that prior to conducting the statistical analyses, the Shapiro-Wilk test (Surhone et al., 2010) was used to assess the assumption of normality. This test is important to determine if the data follows a normal distribution.
RESULTS

Upon completion of the assessments, it was observed that Group A showed an improvement of 4.88 in their overall performance between pre-test marks and post-test marks, as indicated in Table 1. Similarly, Group B demonstrated a better performance in the post-test, achieving an average mean of 7.4, surpassing that of Group A. In other words, the results showed that students of the second group scored higher marks than those of the first group.

To calculate the difference in marks between pre-tests and post-tests for both groups, the author applied a statistical formula to calculate the mean or average difference:

\[
\text{Mean Difference} = (\sum \text{(Post-Training Marks)} - \sum \text{(Pre-Training Marks)}) / N
\] (1)

In this formula, \(\Sigma\) denotes the sum of the marks, Post-Training Marks represents the marks obtained in the post-training exam, Pre-Training Marks represents the marks obtained in the pre-training exam, and \(N\) represents the total number of students in each group. Table 1 presents the results of mean differences for both groups and the difference in means between Group A and Group B to show any variations between them.

Table 1 displays a summary of the descriptive statistics for the four variables in this research: pre-test scores/Group A, post-test scores/Group A, pre-test scores/Group B, and pre-test scores/Group B.

Based on the Test of Normality results in Table 3, the data of all variables were normally distributed because the \(t\) values on all of them were not statistically significant.

Table 1. Groups mean differences

<table>
<thead>
<tr>
<th>Mean Difference- Group A</th>
<th>Mean Difference- Group B</th>
<th>Diff. in means</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.88</td>
<td>7.4</td>
<td>2.52</td>
</tr>
</tbody>
</table>

Table 2. Descriptive statistics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test scores/Group A</td>
<td>38.00</td>
<td>93.00</td>
<td>71.0800</td>
<td>15.12426</td>
</tr>
<tr>
<td>Post-test scores/Group A</td>
<td>50.00</td>
<td>96.00</td>
<td>75.9600</td>
<td>13.89388</td>
</tr>
<tr>
<td>Pre-test scores/Group B</td>
<td>32.00</td>
<td>92.00</td>
<td>71.0400</td>
<td>13.86386</td>
</tr>
<tr>
<td>Pre-test scores/Group B</td>
<td>52.00</td>
<td>98.00</td>
<td>78.4400</td>
<td>12.03495</td>
</tr>
</tbody>
</table>

Table 3. Tests of normality

<table>
<thead>
<tr>
<th>Variables</th>
<th>(t) value</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test scores/Group A</td>
<td>0.960</td>
<td>0.413</td>
</tr>
<tr>
<td>Post-test scores/Group A</td>
<td>0.944</td>
<td>0.188</td>
</tr>
<tr>
<td>Pre-test scores/Group B</td>
<td>0.943</td>
<td>0.173</td>
</tr>
<tr>
<td>Post-test scores/Group B</td>
<td>0.969</td>
<td>0.623</td>
</tr>
</tbody>
</table>
As for analyzing the performance in both groups, after following two different approaches, Table 4 demonstrated a significant difference between the performance of the two groups (0.001). In other words, the results indicated that the application of GNMT in translation-learning classrooms, whether through the conventional approach adopted by Group A or the proposed approach adopted by Group B, which is the newly proposed approach under investigation, is crucial for enhancing students’ performance. It was evident that both groups demonstrated improvement, highlighting the significance of training and applying different methods of utilizing GNMT in translation-learning classrooms.

As it pertains to the significant difference between the performance of both groups, (0.008), the one-sided p-value in Table 5 demonstrated that Group B performance was significantly greater than Group A. This means that there was statistical difference between the marks obtained by students of Group A and marks obtained by students of Group B after employing the proposed approach for utilizing GNMT in translation-learning classrooms.

This paper aimed to explore mindful approaches to employ GNMT effectively in translation-learning classrooms. For this purpose, two research questions were formulated:

1. How should students of translation utilize GNMT effectively in classroom learning?
2. What outcomes can be anticipated from employing different approaches to learning translation through MT?

Based on the analysis, the author can now discuss the findings of this research in relation to the above-mentioned research questions and the corresponding hypotheses.

1. H1: μPreA ≠ μPostA (There was significant difference in students’ marks between pre- and post- applying a conventional approach to learning translation through MT among Group A).

   The author accepted the research hypothesis as there was a statistical difference between the marks obtained by students of Group A before and after students went through the conventional method. The calculated p-value of 0.001 was less than the significance level of 0.05.

2. H2: μPreB ≠ μPostB (There was significant difference in students’ marks between pre- and post- applying a comprehensive meticulous approach to learning translation through MT among Group B).

Table 4. Difference between the performance of the two groups

<table>
<thead>
<tr>
<th>Approach</th>
<th>Mean of Pre-test marks</th>
<th>Mean Post-test marks</th>
<th>t value</th>
<th>P value two-sided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>71.08</td>
<td>75.96</td>
<td>-6.554</td>
<td>0.001</td>
</tr>
<tr>
<td>Proposed</td>
<td>71.04</td>
<td>78.44</td>
<td>-10.718</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Table 5. Performance significance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Levene's test of equality</th>
<th>t test for equality of means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
</tr>
<tr>
<td>Performance</td>
<td>0.450</td>
<td>0.505</td>
</tr>
</tbody>
</table>
The author accepted the research hypothesis as there was a statistical difference between the marks obtained by students of Group B before and after students went through the newly proposed approach. The calculated p-value of 0.001 was less than the significance level of 0.05.

3. \( H_3: \mu_A \neq \mu_B \) (There was significant improvement in translation abilities between Group A and Group B).

The author accepted the research hypothesis as the calculated p-value of 0.008 was less than the significance level of 0.05.

To facilitate a comparative analysis of the outcomes, we present the assessment scores of both Group A and Group B in Table 1, “Group A and Group B Marks,” available in Appendix B. This table provides a clear overview of the performance differences between the two groups throughout the experiment.

**DISCUSSION**

By addressing these research questions and testing the associated hypotheses, this study contributed to researchers’ understanding of effective strategies for integrating GNMT into translation education. The findings will benefit translation instructors and curriculum designers in incorporating effective approaches to teaching translation.

Students from both groups improved their performance to the extent that all of them after the experiment scored above 50 out of 100. Having established the importance of conducting the necessary training, researchers’ focus now shifts to determining the more effective approach for translation-learning classrooms.

As shown in Table 4, the proposed approach yielded better results and led to improved performance among students. The conventional method of integrating machine translation (MT) into classrooms, as outlined in current literature, involves instructing students to effectively utilize MT tools and participate in necessary pre-editing and post-editing tasks. However, the proposed approach is an innovative and comprehensive one that delves deeper into the intricacies of translation-learning. In this groundbreaking approach, students embarked on their translation journey by undertaking a human translation task, employing MT as an auxiliary resource. Subsequently, they thoroughly engaged in pre-editing and post-editing, meticulously scrutinizing and contrasting their own translations with the MT-generated output. By astutely analyzing discrepancies and inconsistencies in both versions of translations, students gained valuable insights into the nuances of translation.

These identified issues served as catalysts for engaging classroom discussions, guided by the instructor, where students delved into the intricacies of translation challenges. Through rigorous examination and collective exploration, students refined their understanding and shaped their final draft of translation. By immersing students in the complete translation workflow and encouraging critical thinking and analysis, the profound impact of this approach on elevating students’ translation prowess was anticipated.

It is, therefore, clear that the use of MT could be a significant addition to the effectiveness of translation-learning. The findings of this study highlighted the importance of incorporating a comprehensive approach, as done by Group B, when utilizing machine translation in the classroom. This approach empowered students to tackle translation tasks on their own, carefully assess the MT output, identify possible shortcomings, and refine their translation skills through well-informed revisions. By following this comprehensive approach, students could leverage machine translation as a valuable reference tool, rather than solely relying on it as a standalone translation solution. This is consistent with other research by Tsai (2022), O’Neill (2019a, 2019b), and Bourdais and Guichon (2020), which also emphasized the usefulness of machine translation for language learning. However, the literature review studies placed a strong emphasis on teaching students to utilize MT tools and
to participate in pre-editing and post-editing (Niño, 2020; Olkhovska & Frolova, 2020), but this research suggested an all-encompassing approach that enabled students to gain a greater knowledge of translation nuances and encouraged their critical thinking and exploration. Moreover, this research focused on the precise application of the comprehensive method, whereas the studies in the literature review gave a variety of pedagogical ideas, such as incorporating additional translation tasks and internet resources (Paterson, 2023).

Overall, the results of this research confirmed the usefulness of GNMT in translation instruction, and they were consistent with studies from the literature review. However, this research adopted a holistic approach that maximized the effectiveness of GNMT in translation-learning.

The author believes the following recommendations could be valuable for translation instructors and curriculum designers:

1. Adopt the comprehensive approach: Instructors are advised to contemplate implementing the innovative approach in classroom learning as it yields better results and leads to improved performance among students compared to the conventional approach.
2. Encourage critical analysis and classroom discussions: Instructors should encourage critical evaluation of MT output and facilitate classroom discussions to develop their critical thinking skills and gain valuable insights into translation problems.
3. Consider MT as a reference tool: Instructors should emphasize the importance of utilizing MT as a reference tool rather than just for translation. This will allow students to make informed changes and produce high-quality translations.
4. Rethink translation learning pedagogies: Instructors and course designers should recognize the importance of integrating machine translation into the curriculum. It makes little sense to prohibit using online tools for translation. It is essential to enhance practicality by inventing and rethinking modes of translation-learning through MT. The pedagogical value of machine translation is still in its early stages. However, it is important to acknowledge a basic principle: machine translation falls short in imparting the essential aspect of delivering value to learners.

In conclusion, the author’s findings advocated for the thoughtful incorporation of machine translation in translation education, focusing on a comprehensive approach that encouraged critical thinking and analysis among students. The author hoped that these practical use recommendations would benefit translation instructors and curriculum designers, leading to more effective translation-learning experiences.

It should be noted that further research and analysis are required to determine the long-term effects and sustainability of the approaches employed by Group A and Group B and to suggest and examine new approaches. Also, future studies could explore additional rubrics and methodologies to provide a more nuanced analysis of translation quality and to assess other aspects such as stylistic choices and cultural appropriateness.

LIMITATIONS OF STUDY

The author acknowledged significant limitations in this research. Firstly, the study was limited to a sample size of 50 BA students enrolled in a single translation course, which might restrict the generalizability of the findings. The results could potentially be influenced by various factors such as students’ individual characteristics, language proficiency, familiarity with machine translation tools, and prior experience. Future studies could complement this research by examining various student groups in different educational contexts, allowing for broader generalizability of the findings.
The author admitted that evaluating the translations with just one evaluator may have had an impact on the validity of the score. Future studies could use several evaluators to rate students’ translations in order to increase the validity of the data.

Furthermore, the author recognized that conducting the experiment and providing training to the students within a single semester represents a relatively short timeframe to capture long-term effects. Developing translation skills and competence is a complex process that requires sufficient time. As the experiment was carried out within a limited timeframe, this might impede the author from observing potential changes in students’ translation skills over an extended period. Consequently, the author did not analyze students’ translation errors individually but rather focused on their overall performance in translation.

Despite these limitations, it was important to recognize the potential value of this methodology for future research endeavors. Other researchers in the field could replicate or even expand upon this methodology to provide valuable insights into the scientific field.

CONCLUSION

In conclusion, machine translation must be utilized to learn the practice of translation. While it is clear that it still needs to be fully embraced, and some educators are still hesitant to use it, MT application in classrooms through conventional learning approaches could enhance the learning process. However, it cannot replace conducting a human translation task but can only act as a supplement. The tools should be used in conjunction to avoid alienating the essence of translation-learning and depriving effectiveness of the same.

Given the rapid pace of innovation, it’s foreseeable that the landscape of learning translation practices will undergo a significant transformation. This evolution is likely to involve heightened sophistication and a greater embrace of machine translation systems beyond what is observed in GNMT. As time progresses, the learning process is poised to become more user-friendly, interactive, and easily accessible. Therefore, educators should remain attuned to these technological advancements to avoid falling behind in these invaluable yet intricate tools.

Furthermore, there’s an opportunity to offer practical strategies to key education stakeholders, particularly within the Arabic-English language pair, where research and solutions remain relatively scarce.

DECLARATION OF COMPETING INTERESTS AND FUNDING

Competing Interests: I declare that there are no competing interests associated with this manuscript.

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. Funding for this research was covered by the author of the article.
REFERENCES


APPENDIX A

Small Sample of Students’ Work Throughout the Experiment

In this appendix, you will find a selection of student work collected at various stages of the experiment. This collection showcases the practical application of the strategies discussed in the article and offers a glimpse into the learning journey of our participants.

Figure 2.

APPENDIX B

Group A and Group B Marks

This table displays the assessment scores of Group A and Group B at different stages of the experiment. The data underscores the variations in performance between the two groups, contributing to the insights discussed in the article.
Figure 3.

Figure 4.
Figure 5.

<table>
<thead>
<tr>
<th>Google Translate output</th>
<th>Post editing</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Syrian refugees may be conducted</td>
<td>In some cases, they may be conducted</td>
</tr>
<tr>
<td>in a regular manner. The Turkish way had been the first step. The refugees are mostly women and children.</td>
<td></td>
</tr>
<tr>
<td>The operation requires a joint effort between the Spanish and the French.</td>
<td></td>
</tr>
<tr>
<td>The French are providing support in terms of logistics and security.</td>
<td></td>
</tr>
<tr>
<td>The Spanish are providing support in terms of medical assistance.</td>
<td></td>
</tr>
<tr>
<td>After the first wave,</td>
<td></td>
</tr>
<tr>
<td>to satisfy the demand.</td>
<td></td>
</tr>
<tr>
<td>They will be brought to Spain.</td>
<td></td>
</tr>
<tr>
<td>They said, “We do not want to stay here. We want to stay in Spain.”</td>
<td></td>
</tr>
</tbody>
</table>

Figure 6.

<table>
<thead>
<tr>
<th>Students’ editing at the sentence level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Source Text</strong></td>
</tr>
<tr>
<td>Before you start reading, I would like you to think about this question.</td>
</tr>
<tr>
<td>We can’t stay in this hotel. We have to find another one.</td>
</tr>
<tr>
<td>We are completely helpless. In fact, we have never been to this country. We have no idea what is happening. We are not informed about it and we don’t have permission to do anything.</td>
</tr>
<tr>
<td>The landscape is beautiful, with its mountains and forests.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Google Translate output</th>
<th>Post editing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before you start reading, I would like you to think about this question.</td>
<td></td>
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<tr>
<td>We can’t stay in this hotel. We have to find another one.</td>
<td></td>
</tr>
<tr>
<td>We are completely helpless. In fact, we have never been to this country. We have no idea what is happening. We are not informed about it and we don’t have permission to do anything.</td>
<td></td>
</tr>
<tr>
<td>The landscape is beautiful, with its mountains and forests.</td>
<td></td>
</tr>
<tr>
<td>We do not expect a satisfactory answer. Think of it as if your are talking to yourself, but instead, you are talking to me.</td>
<td></td>
</tr>
</tbody>
</table>
### Figure 7.

<table>
<thead>
<tr>
<th>Students' translation</th>
<th>Google Translate output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Take my president K jihud planex</td>
<td>president x planex</td>
</tr>
<tr>
<td>2. Attention to an official story from a President</td>
<td>missing words from official story from President</td>
</tr>
<tr>
<td>3. We must seize an opportunity to build a sustainable world</td>
<td>world sustainable building</td>
</tr>
<tr>
<td>4. The attention was on to say that</td>
<td>the attention was on to say that</td>
</tr>
<tr>
<td>5. The organization issued a press release</td>
<td>the organization issued a press release</td>
</tr>
<tr>
<td>6. The organization issued a press release</td>
<td>the organization issued a press release</td>
</tr>
<tr>
<td>7. Tar park is an obvious international</td>
<td>Tar park is a clear international park</td>
</tr>
</tbody>
</table>

### Figure 8.

Assignmen 2

The end of historically low interest rates is being described as good news for banks as they are making more money from the widening gap between how much people borrow and how much they have to pay back to the bank. However, the recent turbulence in the banking sector raises the reality of a lot more complicated situations.

A recent report published by the Financial Times showed that some private banks in Europe are stuck with big loans with low-interest rates that are much lower than the current standard. While the banks with a higher share of their loans and variable rates in their loan books risk a wave of defaults from borrowers that can no longer service their debts if they immediately reject more loans due.
Figure 9.

The final draft of translation

Figure 10.

The final draft of translation

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<table>
<thead>
<tr>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test marks</td>
<td>Post-test marks</td>
</tr>
<tr>
<td>Student number</td>
<td>Marks out of 100</td>
</tr>
<tr>
<td>1A</td>
<td>66</td>
</tr>
<tr>
<td>2A</td>
<td>73</td>
</tr>
<tr>
<td>3A</td>
<td>51</td>
</tr>
<tr>
<td>4A</td>
<td>68</td>
</tr>
<tr>
<td>5A</td>
<td>88</td>
</tr>
<tr>
<td>6A</td>
<td>43</td>
</tr>
<tr>
<td>7A</td>
<td>93</td>
</tr>
<tr>
<td>8A</td>
<td>78</td>
</tr>
<tr>
<td>9A</td>
<td>70</td>
</tr>
<tr>
<td>10A</td>
<td>89</td>
</tr>
<tr>
<td>11A</td>
<td>63</td>
</tr>
<tr>
<td>12A</td>
<td>55</td>
</tr>
<tr>
<td>13A</td>
<td>74</td>
</tr>
<tr>
<td>14A</td>
<td>86</td>
</tr>
<tr>
<td>15A</td>
<td>72</td>
</tr>
<tr>
<td>16A</td>
<td>38</td>
</tr>
<tr>
<td>17A</td>
<td>90</td>
</tr>
<tr>
<td>18A</td>
<td>83</td>
</tr>
<tr>
<td>19A</td>
<td>77</td>
</tr>
<tr>
<td>20A</td>
<td>62</td>
</tr>
<tr>
<td>21A</td>
<td>69</td>
</tr>
<tr>
<td>22A</td>
<td>83</td>
</tr>
<tr>
<td>23A</td>
<td>90</td>
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<tr>
<td>24A</td>
<td>56</td>
</tr>
<tr>
<td>25A</td>
<td>60</td>
</tr>
</tbody>
</table>