

Enhancing translation teaching for L2 learners through ChatGPT: A study of AI-assisted Arabic-German translation

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Abstract. This study investigates the effectiveness of using ChatGPT as a teaching tool in enhancing Arabic-to-German translation skills. An experimental group, using ChatGPT throughout a 15-week semester, was compared to a control group that followed traditional translation instruction methods. Pre- and post-tests were administered to assess translation performance. Results demonstrated that students in the experimental group significantly outperformed those in the control group, showing improvements in sentence structure, vocabulary selection, grammatical accuracy, and the translation of idioms and collocations. Despite minor linguistic errors, students using ChatGPT showed greater progress in understanding translation nuances. The study highlights the potential of AI-powered tools in language learning, particularly in translation pedagogy, and suggests future research directions, including the long-term impact of AI on advanced translation skills, and the balance between machine and human input in the educational process. This study contributes to the growing body of literature on AI-assisted language teaching.

Keywords: *ChatGPT in translation, AI-assisted language learning, translation pedagogy, Arabic-German translation, Artificial Intelligence in education.*

Накраш Надя, Марван Джарах, Гасан Есраа, Сукайна Алі. Покращення навчання перекладу студентів, які вивчають другу мову, за допомогою ChatGPT: дослідження перекладу з арабської на німецьку з підтримкою ШІ.

Анотація. У цьому дослідженні вивчається ефективність використання ChatGPT як навчального інструмента для покращення навичок перекладу з арабської на німецьку мову. Експериментальну групу, яка користувалася ChatGPT протягом 15-тижневого семестру, порівнювали з контрольною групою, що навчалась за традиційною методикою. Для оцінки рівня перекладацької підготовки було проведено вхідне та підсумкове тестування. Результати показали, що студенти з експериментальної групи значно перевершили учасників контрольної групи, продемонструвавши покращення у побудові речень, доборі лексики, граматичній точності, а також у перекладі ідіом і сталих словосполучень. Незважаючи на незначні

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мовні помилки, студенти, які використовували ChatGPT, продемонстрували кращі результати у розумінні нюансів перекладу. Дослідження підкреслює потенціал інструментів на основі ШІ в мовному навчанні, зокрема у викладанні перекладу, і пропонує напрями для подальших розвідок, зокрема вивчення довгострокового впливу ШІ на розвиток професійних перекладацьких навичок і пошуку оптимального балансу між машинним і людським компонентом у навчальному процесі.

Ключові слова: *ChatGPT у перекладі, мовне навчання з підтримкою ШІ, методика викладання перекладу, переклад з арабської на німецьку, Штучний Інтелект в освіті.*

Introduction

In the modern age of technology and globalization, the demand for proficient translators and interpreters has significantly increased. As language barriers continue to vanish, the need for effective and accurate communication across different cultures and (practice) communities becomes increasingly important and, in some cases, urgent (see Ratna, 2019). While traditional translation techniques have served their purpose, the use and effects of artificial intelligence (AI) have opened new avenues for enhancing the translation and interpretation processes (see Brynjolfsson et al., 2019; Mohamed et al., 2024). One such AI tool, which receives remarkable attention is ChatGPT, which is a large language model developed by OpenAI (Wu et al., 2023). The present study aims to explore the potential of ChatGPT as a tool to enhance the translation skills and performance of students translating from Arabic to German.

The major rationale of this study is based on the fact that the field of translation studies has witnessed a growing interest in investigating the intersection of technology and language learning (Munday et al., 2022). Yet, the specific application of AI-assisted tools, including ChatGPT, to improve translation skills remains relatively underexplored (see Lee, 2023 along these lines). This is particularly valid for language pairs such as Arabic and German, which present unique linguistic and cultural challenges. By exploring the effect of ChatGPT on student translation performance, the current work aims to contribute to the enriching body of research on AI-powered language learning and translation. If ChatGPT is proven to be an effective tool in this regard, it could make available a valuable supplement to the traditional teaching methods of translation (see Fan et al., 2023 along these lines). By giving the students personalized feedback, opportunities for practice, and instant translations, ChatGPT could assist in accelerating the learning process and enhancing the overall translation quality.

In particular, this article explores the specific methods where ChatGPT can be utilized to enhance student translation skills. It investigates how ChatGPT can offer immediate feedback on translations, provide alternative phrasings, and point to improvements in terms of accuracy and fluency. By conducting a comprehensive analysis of student performance before and after using ChatGPT (in the experimental group), this study provides important insights into the tool's effectiveness; ChatGPT can be used effectively as a tool that enhances the students' translation practices. Therefore, the impact of ChatGPT on the translation skills and performance of Arabic and German students is evident. As ChatGPT is a large language model trained on a massive amount of text data, it is able to generate human-quality translations. In most cases, it provides accurate and contextually relevant translations. Therefore, ChatGPT should be integrated into the translation curriculum because it has an important impact in enhancing the student learning and performance (see Sahari et al., 2023; Zhao et al., 2024).

The structure of the paper is organized to provide a comprehensive overview of the study and its implications. Section 2 sets the scene by providing background on the use of AI tools in language learning, while Section 3 particularly focuses on ChatGPT's integration into translation pedagogy. It contextualizes the need for such research in light of the growing prominence of AI in education and translation. Section 4 outlines the methodology, detailing the approach used for data collection and analysis, with specific attention to the experimental design and the control group setup. In Section 5, the main findings are presented, highlighting the significant improvement in translation skills of students using ChatGPT, as compared to the control group. Section 6 offers a discussion of these results, drawing connections to recent scholarship on AI-assisted translation learning and its practical applications. Finally, Section 7 concludes the paper, summarizing the key insights and proposing directions for further research on AI-powered translation tools in educational settings, including the need for longitudinal studies and expanded AI integration.

Setting the Stage

In Jordan, the German language occupies a relatively niche yet growing position when compared to English, which is considered far more dominant in this regard. English is the primary foreign language in Jordan, which is taught across all educational levels. (Alomoush & Al-Na'imat, 2018). English is also viewed as the essential tool for communication, education, business, and diplomacy (see Alhabahba et al., 2016). English is a compulsory subject in

schools, and most university programs, especially those in scientific, medical, and engineering fields, are taught in English. Its prevalence in media, academia, and the private sector cements its role as the principal second language in the country, often regarded as a key to socioeconomic mobility (see Hamdan & Hatab, 2009).

In contrast, German, while not as widespread as English, has seen a gradual increase in interest, particularly in academic and professional circles. The growing prominence of Germany as a global leader in science, technology, and industry has made the German language increasingly attractive to Jordanians seeking higher education and career opportunities in German-speaking countries. A significant number of Jordanian students pursue scholarships or postgraduate studies in Germany, supported by programs such as those offered by the German Academic Exchange Service (DAAD). This has led to a rising demand for German language courses at institutions like the Goethe-Institut Amman, which provides language training and cultural programs aimed at fostering deeper ties between Jordan and Germany.

Despite this growing interest, German remains far less integrated into Jordanian society than English. Its use is largely confined to specific domains, such as academia, engineering, and technical fields, where knowledge of German can offer distinct advantages. Working with German businesses or looking for job in industries where Germany is well-represented worldwide, such engineering, architecture, and healthcare, are other reasons why learning German is thought to be advantageous. Nonetheless, English continues to be the more useful and approachable foreign language for the typical Jordanian, providing more possibilities both domestically and abroad. Furthermore, English has been a part of Jordan's educational system for a long time, and because of its supremacy in the world, it will always be given priority in curriculum, teacher preparation, and resource distribution (see Al-Saidat, 2009).

In Jordan, German is a foreign language with great cultural and economic significance. German is regarded as a language of science, technology, and business, and knowing it can lead to a number of chances. The English and German curriculum at the University of Jordan is essential to Jordanian students' development of their German language abilities. Students enrolled in this program will receive a thorough education in both languages. Nonetheless, this program's translation classes frequently use conventional approaches like dictionaries, grammar manuals, and human translation strategies. Language translation is not an exception to how artificial intelligence (AI) has transformed different fields. The potent language model ChatGPT, created by OpenAI, has the potential to greatly improve translation. This research

attempts to look into the the impact of ChatGPT on the accuracy of Arabic-German translations produced by students at the University of Jordan and explore its potential as a teaching tool to improve student performance.

In the next section, we review a number of major works that investigated the use of ChatGPT as a translation tool and teaching method to enhance student performance in translation.

The Use of ChatGPT as a Translation Tool and Teaching Method to Enhance Student Performance in Translation

Recent studies have increasingly explored ChatGPT's potential as a translation tool, often comparing its output to traditional systems like Google Translate and DeepL. Liu et al. (2023) highlight that, unlike conventional tools, ChatGPT's advanced language modeling enables it to handle idiomatic expressions and contextual nuances with greater accuracy, producing translations that go beyond word-for-word equivalence.

Lee (2023) emphasizes that while machine translation has evolved gradually over the years, the emergence of large language models (LLMs) such as ChatGPT marks a significant shift. These models, although not specifically designed for translation, can rival or surpass specialized tools. Lee calls for a reconceptualization of translation practice, viewing AI as an extension of human cognitive capabilities rather than a replacement. He advocates for a posthumanist perspective that redefines the translator's role and the competencies required in the digital age.

Khoshafah (2023) observes that ChatGPT can deliver generally accurate translations, but its outputs tend to be simpler in structure and may lack the stylistic richness and cultural nuance of human translations. He cautions against relying on ChatGPT for complex or specialized texts—such as legal, medical, or religious content—due to its limited domain-specific and cultural awareness. He also points to risks in handling idioms and colloquial expressions, which may be rendered inappropriately.

In the context of translation pedagogy, several studies underscore the value of integrating AI tools like ChatGPT. Yuxiu (2024) reports that AI can enhance students' translation accuracy and support more interactive, efficient teaching through real-time feedback. Similarly, Kong (2022) emphasizes AI's role in fostering learner autonomy and providing exposure to authentic bilingual corpora. Hasan et al. (2025) explore ChatGPT's application in teaching Arabic-Korean translation, noting improved student engagement and comprehension—findings that align with this study's focus on Arabic-German translation. Baskara and Mukarto (2023) add that AI tools support higher-order

thinking and help learners manage complex language tasks in academic settings.

Sahari et al. (2023) investigate ChatGPT's reception in the Arab academic context by interviewing teachers and students. While students favored ChatGPT for its fluency and usability, instructors tended to prefer Google Translate for its familiarity and consistency. Participants acknowledged both strengths and limitations, recognizing ChatGPT's usefulness for drafting and editing, but raising concerns about its reliability in more judgment-intensive translation tasks.

Al-Wasy and Mohammed (2024) explore the translation of euphemisms from Arabic to English, comparing strategies used by human translators and AI models. They find that while AI tools often rely on direct or literal strategies, human translators demonstrate greater cultural adaptability. Their quantitative analysis reveals that human translations more effectively apply strategies like cultural substitution, particularly when translating religious and sensitive texts. The study also notes that the direction of translation (e.g., Arabic to English vs. English to Arabic) influences AI performance.

Fan et al. (2023) provide a broader educational perspective, highlighting ChatGPT's transformative potential in translation teaching. They suggest it can personalize instruction, support independent learning, and innovate classroom management. However, they also raise serious concerns about academic integrity, over-reliance on automation, and the ethical risks associated with AI. They stress the need to maintain the human dimension in education while thoughtfully incorporating AI.

Fütterer et al. (2023) offer insight into public perceptions of ChatGPT by analyzing Twitter data. Their findings show education to be one of the most discussed themes, with public sentiment ranging from optimism about enhanced learning to concern over cheating and misinformation. They argue that academic researchers and policymakers should guide these conversations to shape responsible AI adoption.

Finally, Haryanti (2024) evaluates ChatGPT's role in helping students translate from Indonesian to English. She identifies several advantages: grammatical accuracy, quick feedback, accessibility, and adaptability. These features promote self-directed learning and improve student motivation. Nevertheless, she echoes other researchers in stressing that ChatGPT should be seen as a supplementary tool that enhances, rather than replaces, traditional instruction.

In this section, we have reviewed the findings of several related studies. Given the vast body of literature on the topic, no single study can fully encompass it all. However, two main patterns emerge. First, human

translation, particularly by professional translators, is superior to ChatGPT in terms of producing high-quality translations. The second pattern suggests that ChatGPT can serve as a valuable tool for helping students improve their translation skills. This paper aims to provide additional evidence supporting the latter finding, with novel insights drawn from Arabic-to-German translation. What sets this study apart is that ChatGPT was used consistently throughout the semester, giving students ample exposure to translations generated by the model, along with feedback that aimed to enhance their translation abilities.

Therefore, the current work seeks to answer the question of how much ChatGPT improves the accuracy of Arabic-German translations produced by students at the University of Jordan.

In the following section, we elaborate on the methods we employed to address these two questions

Method

The study is designed to assess the impact of using ChatGPT as a teaching tool to enhance student performance in translation. Two groups of students, enrolled in a translation course, are involved in the study: a control group and an experimental group. The control group receives traditional translation instruction, while the experimental group is exposed to ChatGPT as part of the teaching method. The goal is to compare the translation performance of both groups and assess whether the use of AI improves student learning outcomes.

This study focuses on the cognitive processes involved in translation, specifically in relation to how students decode the source language and encode the target language. Psycholinguistically, translation involves both comprehension (decoding) of the source text and production (encoding) of the target text, processes that require complex cognitive mechanisms such as semantic mapping, syntactic structuring, and lexical retrieval. By using ChatGPT as a tool in the experimental group, the study examines how AI-assisted feedback affects these cognitive processes. The real-time corrections provided by ChatGPT offer immediate insights into errors related to syntax, semantics, and vocabulary choice, potentially impacting learners' cognitive load and improving their efficiency in translation tasks. Furthermore, the study investigates how students' cognitive load is influenced by the use of AI tools: by automating certain aspects of the translation process (such as grammar checks), ChatGPT may reduce extraneous cognitive load, freeing cognitive resources for more complex aspects of translation, such as the nuanced interpretation of idiomatic expressions and contextual meanings. This

psycholinguistic approach aims to understand how AI tools like ChatGPT could help optimize cognitive resources, aiding students in focusing on more advanced language processing while avoiding errors in basic structures.

Participants

The participants in the study are 40 undergraduate students enrolled in an Arabic-German translation course at the University of Jordan during the fall semester of 2024. The students are divided into two intact classes: a control group consisting of 20 students and an experimental group of 20 students. The participants' ages range from 20 to 23 years old, and the gender distribution is relatively balanced, with 22 females and 18 males across both groups. All participants are native Arabic speakers and have been learning German as a foreign language for at least three years. Their proficiency in both Arabic (source language) and German (target language) was assessed using a combination of course grades, in-class language performance, and a diagnostic translation proficiency test designed by the course instructor and validated by a second faculty member. This ensured that all participants had a similar level of linguistic competence and translation aptitude prior to the intervention. All students are majoring in German Language and Literature. Their academic background includes prior coursework in general translation theory, contrastive linguistics, and practical translation. The prior training emphasized fundamental translation strategies such as literal translation, modulation, and adaptation. Instruction was delivered using authentic bilingual texts, glossaries, and guided exercises from official textbooks used in the department.

Inclusion criteria for participation in the study required students to have completed at least two prior translation courses and to have achieved a minimum GPA of 2.5 in their major-related courses. Students who were repeating the course or who had not completed the prerequisite courses were excluded from the study. Recruitment followed a naturalistic approach, as the study was embedded into two regular course sections. Participation in the research component was voluntary, and all students provided written informed consent. The study received ethical approval from the Institutional Review Board (IRB) of the University of Jordan, and all procedures adhered to ethical research standards concerning human subjects.

Design and Procedure

The study spans a semester, with participants engaging in biweekly translation exercises. Both groups are tasked with translating identical source texts into

the target language. However, the experimental group's methodology incorporates interaction with ChatGPT, while the control group undertakes translation activities in a traditional, AI-free manner.

The design of the experiment involves three key stages for the experimental group in each class:

1. **Initial Translation:** Students in the experimental group are first asked to translate the text on their own, using traditional methods and resources such as dictionaries and reference books. This mirrors the process followed by the control group, ensuring that both groups engage in independent translation as part of their learning process.

2. **ChatGPT Translation:** After completing their own translations, students in the experimental group are asked to compare their versions with a translation generated by ChatGPT. This step involves critical analysis, where students assess the differences between their work and ChatGPT's output. Instructors facilitate class discussions, encouraging students to explore why certain words, phrases, or sentences were used by ChatGPT. They are prompted to reflect on contextual choices made by the AI tool and compare these with their own translation decisions.

3. **Assessment and Feedback:** In the final stage, ChatGPT is used to assess the students' translations. Students submit their translations to ChatGPT, which identifies and points out potential errors, inconsistencies, or areas where the translation could be improved. The feedback provided by ChatGPT is reviewed in class, and students are encouraged to ask questions or seek clarification on specific issues. The instructor facilitates a reflective discussion, enabling students to understand the linguistic or stylistic challenges they encountered and how AI can offer solutions or alternatives.

Conversely, the control group adheres to a conventional translation learning paradigm. Following the independent completion of their translations, students receive feedback from the instructor, rather than from ChatGPT. The feedback is provided in a standardized format, addressing issues such as lexical choices, grammatical correctness, and overall coherence. Notably, the control group does not engage in the comparative analysis of their work with an AI-generated translation or benefit from the automated feedback provided by ChatGPT.

Data Collection

The data collected in this study include the following components:

1. **Translation Quality:** The primary metric for assessment is the quality of student translations in both groups. Translations are evaluated based on

criteria such as accuracy, fluency, and adherence to the intended meaning of the source text. Both the instructor and ChatGPT are involved in grading the translations, ensuring that a combination of human and AI assessment is used to measure performance. Translations are graded on a scale from 1 to 10, with a detailed rubric to standardize evaluation across both groups.

2. Pre- and Post-Tests: At the beginning of the semester, a pre-test is administered to measure the baseline translation skills of both groups. A post-test is conducted at the end of the semester to evaluate improvement in translation ability. The comparison between pre- and post-test scores helps to assess the overall impact of using ChatGPT on student learning outcomes. To analyze these results, a quantitative method was applied. A paired samples t-test was used to compare within-group differences (pre- vs. post-test) for both the experimental and control groups. Additionally, an independent samples t-test compared post-test scores between the two groups. This allowed the researchers to determine whether improvements were statistically significant and could be attributed to the AI intervention. All statistical analyses were conducted using SPSS, with significance set at $p < 0.05$.

3. Student Reflections and Surveys: In the experimental group, students are asked to reflect on their experience using ChatGPT for translation tasks. They complete weekly surveys that capture their perceptions of the AI tool's usefulness, their confidence in translating, and whether they believe their skills have improved as a result of interacting with ChatGPT. These reflections provide qualitative data that will be analysed to understand the subjective impact of using AI as a teaching aid.

In summary, this study employed a comparative design to investigate the impact of AI-assisted translation on student learning outcomes. The experimental group received supplementary instruction incorporating ChatGPT, while the control group followed a traditional translation learning model. The data collected from both groups will be analyzed to evaluate the effectiveness of AI-assisted translation in enhancing translation skills and overall language proficiency.

Results

This section presents three original Arabic texts that were assigned to students in both the control and experimental groups for translation into German, in conjunction with other texts throughout the semester. Initially, six translation samples from two students (chosen arbitrarily) in the control group, who did not use ChatGPT, will be shown. Subsequently, six samples from two students in the experimental group, who translated the texts with the help of ChatGPT-

generated feedback, will be presented. These exemplars will illuminate the evolution of the students' translation skills across the semester, with the first set collected at the outset, the second set midway through, and the third set at the conclusion of the semester.

Translation Samples from the Control Group

Upon a thorough examination and analysis of the students' translations, it can be concluded that the translation skills of the two students have shown some degree of improvement over the course of the classes, though this progress remains slow and subtle. The students continued to repeat several of the errors identified in the pre-test, which fall into categories such as Rendition Errors, Language Errors, and Miscellaneous Errors as outlined in Liao's (2010) Error Analysis Model.

Original text in Arabic No. 1:

كانت ميرا فتاة محظوظة لنشئونها في أسرة متحابية. ميرا هي الفتاة الصغرى في أسرتها المكونة من أربعة أفراد وكانت تحب والداها جدا. قام والدها بعد ولادتها بتبني طفل صديقه بعد وفاة والديه في حادث مؤسف ولم يكن للطفل أبنية أقارب في البلاد. كبر الطفل مع الإخوة وأصبح جزءا من العائلة. كان على الأب العمل بجد ليتمكن من إعالة أسرته. كبرت ميرا وكانت طالما تحلم بتأسيس عائلة مع الشخص الذي أحبته. تزوجت ميرا وأرادت أن تصبح أما. إلا أن زوجها لم يكن متأكدا من قراره في إنجاب طفل معا، حيث كانت هناك بعض الصعوبات التي كان من الممكن أن تؤدي إلى الطلاق. لكن سرعان ما أصبحت ميرا في انتظار طفلها الأول. حاول الزوجان تخطي المشاكل إلا أنهما لم يتمكنوا من ذلك فانفصلا، ولكنهما كانا قد حصلوا على حق الحضانة المشتركة لطفلهما.

Student A:

Mera war sher glücklich madchen, dass sie in einer liebevollen aufwachsen. Mera war das kleinste Mädchen in ihre familie das die von fier Köpfigen und liebte ihre familie shera Nach ihy gebuke der Ihr Vater adapterte eine kind einkind seine seburen Freund Kind und das war nach seine Freunde tod in eine schlieschte unfall. Der Das Kind hat keine engeste entfernte Verwandte. Das Kind aufwachsen mit ihr geschwister und schön fasst zur Familie gehören. Der Vater soll so Viel arbeiten seine Familie durchbringen. Mera aufwacht und sie tatraumt immer mit der ihr libeste partnerschaft um einer familie grunden. Sie & verheiratet und mochet einer mutter wurden. Aber ihr mann war sich ja doch nicht seh er secher das thr mit ihr ein Kind lebekommen. Und es gibt viele schwerigkeiten Zur Scheidung führen. Aber bald wurden Mera erwartet für ihr ersten Kind. Das Paar versuchte die Probleme so zu überwenden aber die pari paar hat das nicht fanktionert und hat erscheidet. Sie hatten jedoch das ge meinsame sogericht "För ihr Kind gehalten.

Student B:

Mira war eine glückliche Mädchen, weil sie in einer liebevolle Familie aufgewachsen hat. Mira ist die Jüngste Mädchen in ihre Familie, die sie auf vier Mitglieder enthalten, Mira liebt ihr Eltern so sehr. Nach der Geburt des Mädchen haben ihre Eltern eine Freundenskind adoptiert, weil seine Eltern in ein unglücklicher Unfall zu Tode kommen und das war keine engsten Verwandten in der Land. Das Kind hat mit seine Geschwister aufgewachsen und er wird ein Mitglieder in die Familie. Der Vater hat schwer gearbeitet um seine Familie durchzubringen. Mira hat aufgewachsen und sie

immer will eine Familie gründen mit die verliebt Person. Mira hat geheiratet und sie möchte ein Mutter bekommen aber ihre Ehemann war nicht so sicher über Kinder gründe gemeinsamm. Wo sie waren verschiedene Gründe können zu Scheidung, aber Bald erwartete Mira ihr erstes Kind, Die Ehepaar haben Überspringen Sie die Probleme versucht aber das war fruchtlos so sie trennen sich, aber sie haben in der Regel das gemeinsame Sorgerecht erhalten.

Original text in Arabic No. 2:

حصلت على منحة دراسية في الخارج. قررت أن أضرب عصفورين في حجر واحد، حيث سأسافر للدراسة والعمل في الوقت ذاته. سأحاول التأقلم مع جميع الظروف. قد لا يوجد وقت كاف لأخذ قسط من الراحة بسبب الانشغال بالدراسة والعمل معاً، ولكن كما يقولون، مشوار الألف ميل يبدأ بخطوة ولكل مجتهد نصيب، وفي النهاية لا بد أن تحصد ما تزرع. بدأت حياة جديدة في بلد جديد. كم كنت سعيدة ومتحمسة لهذه المغامرة، ولكن الغربة كانت أصعب مما ظننت وقد توالى علي الصعوبات. فأنا لم أعتد إعداد الطعام ولم أعتد الوحدة. ولكنني شعرت لأول مرة بمتعة الحياة رغم صعوبتها، فقد كنت أتعلم شيئاً جديداً في كل يوم، فلم يكن أي يوم شبيهاً باليوم الذي سبقه.

Student A:

Ich habe das Stipendium in Ausland erhalten. Ich zwei fliegen mit einer Klappe schlagen beschlossen, denn ich werde zu Arbeit und studieren in gleichzeitig reisen, ich versuche mit alles anpassen. Vielleicht gibt es keine Zeit zu erholen, Weil viele Arbeit und studieren in gleichzeitig beschäftigung, Aber wie sie sagen, jeder reise beginnt mit dem ersten schritt, ohne Fließ kein preis, und am Ende was der Mensch sat, wird er ernten.

Ich fange neue leben an in Deutschland, wie viele ich war glücklich und aufgereget für diese Abenteuer, aber die Fremdheit war schwere was ich denke. Denn haufen die Schwierigkeiten. Ich bin nicht gewohnt Essen zu bereiten und alleine sein. Aber ich gefuhle erstmal in Freude am leben trotz Schwierigkeiten, denn ich lerne neue dinge jeder tag, Es war nicht jeden tag wie die tag davor.

Student B:

Ich habe ein Das Stipendium in Ausland bekommen, Ich habe mich entschließen zwei Fligen mit einer Klappe Schlagen, denn Ich habe abreise Für Studieren und arbeiten Zur gleichzeitig . Ich werde Versuchen alle. Es gibt vielleicht nicht genug Zeit, um eine pause zu machen, weil beschiftigen mit dem Stadium und der Zusammenarbeit, abel alles sagen Ein Reise von tausend Millen beginnt mit dem ersten Schritt und für jeden Fleiß gibt es seinen preis und Was der mensch Sät.

Ich habe ein neue Leben im neue Land begonen. Ich war glücklich und aufgeregt für dieses Abenteuer, aber die Fremdheit war schwieriger als ich dachte, und die schwierigkeiten häuften sich auf mich. Ich bin nicht gewohnt Essen zubereiten und nicht gewohnt allein zu sein. aber ich fühlte ersten mal Freude am Leben trotz schwierigkeiten. denn ich Lernte jeden Tag etwas Neues. Kein Tag war wie der Tag davor.

Original text in Arabic No.3:

يقول الناشط الإسرائيلي اليساري نمرود فلاشنيبرغ: "إنَّ ما نطلبه من ألمانيا بسيط للغاية، لا نتوقع منها أن تكون مثل أيرلندا، التي تدعم فلسطين بشدة. لكننا ننتظر أن تعارض ألمانيا موقف الحكومة الإسرائيلية. كل ما نقوله هو أن نلتزم ألمانيا بموقفها الداعم لحقوق الإنسان والقانون الدولي وحل الدولتين. لهذا يجب على برلين أن تتصرف وفقاً لهذا الموقف، بدلاً من تقديم الدعم الكامل لإسرائيل"

منذ نهاية يناير 2024 احتج الناشط الإسرائيلي اليساري نمرود فلاشنيبرغ مع ناشطين إسرائيليين آخرين أمام وزارة الخارجية الألمانية في برلين للمطالبة بوقف إطلاق النار في غزة وبحل سياسي إسرائيلي فلسطيني

Student A:

Nach dem, was der israelische Linke Aktivist sagt: was wir von Deutschland Verlangen ist sehr einfach: muss Deutschland sich der Haltung Israelische Regierung widersetzen. Was wir sagen statt anbieten Deutschland vorbehaltlose Unterstützung für Israel, dass Unterstützen Menschenrechte, das Völkerrecht und die zwei-Staaten Lösung verpflichten und Berlin muss für diese Haltung handeln.

Seit letzter Januar 2024 der linke Aktivist Namrod Flischenberg demonstriert mit anderen israelischen Aktivisten vor dem auswärtigen Amt in Berlin, für verlangen eine Waffenstillstand in Gazastreifen und israelische palästinensische politische Lösung.

Student B:

Der linke Aktivist Namroud Flaschenberg sagt dass, wir sehr einfache Dinge von Deutschland fragen. Wir erwarten, dass Deutschland die Haltung der israelischen Regierung widersetzen will. Was wir sagen ist, dass Deutschland sich der Unterstützung von Menschenrechten, dem Völkerrecht und der zwei-Staaten-Lösung verpflichtet und dass Berlin auch so muss, statt Israel zu vorbehaltlose Unterstützung.

Seit Ende Januar 2024 hat der linke Aktivist Namroud Flaschenberg mit anderen israelischen Aktivisten vor das Auswärtige Amt in Berlin demonstriert. Sie verlangen einen Waffenstillstand im Gazastreifen und israelische palästinensische politische Lösung.

Translation Samples from the Experimental Group

The students in this group were instructed in translation with the aid of ChatGPT, an AI tool that offered real-time, detailed feedback during class sessions. ChatGPT assessed the group's translations, identifying errors and providing explicit guidance on how each student could improve their work. This process was carefully documented with a series of screenshots capturing interactions with ChatGPT. Representative screenshots will accompany each translation sample. The intervention spanned 15 weeks of the semester, conducted in the classroom, and provided a visual representation of the group's developmental progress.

Based on the feedback from ChatGPT, a significant enhancement in the group's translation skills can be observed, particularly in their ability to avoid many of the linguistic errors made in the pretest and earlier translations. This improvement was substantial and almost consistently present across the texts they translated, demonstrating steady progress from one translation to the next.

The following samples illustrate the considerable progress achieved by two students, Student A and Student B, in their translation abilities. The samples from Arabic Text No. 1 serve as the initial benchmark, highlighting the beginning of their noticeable improvement. The samples from Arabic Text No. 2 demonstrate a significant advancement in translation quality, while those

from Arabic Text No. 3 show the students' impressive refinement of their Arabic-German translation skills over time, aided by ChatGPT

Translation Samples for Arabic Text No.1

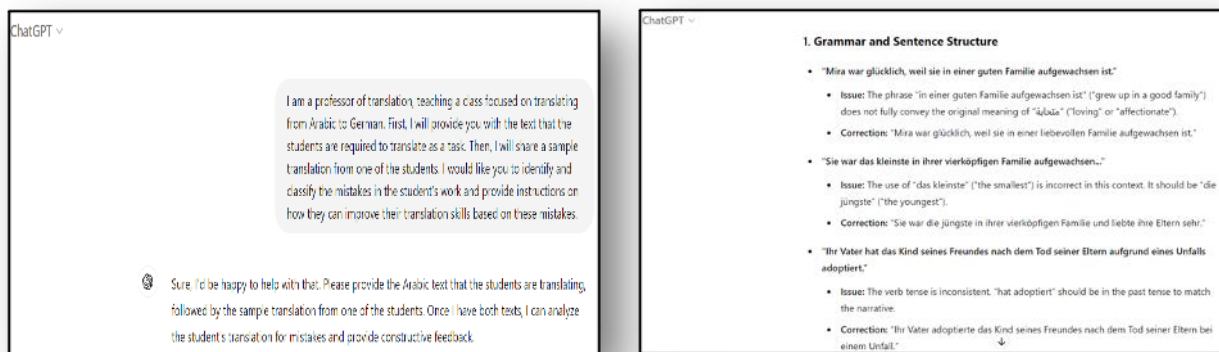
Student A:

Mira war glücklich, weil sie in einer guten Familie aufgewachsen ist. Sie war das kleinste in ihrer vierköpfigen Familie aufgewachsen und sie liebte ihre Eltern sehr. Ihr Vater hat das Kind seines Freundes nach dem Tod seiner Eltern aufgrund eines Unfalls adoptiert. Im Land hat das Kind keine nahen Verwandten. Das Kind ist mit seinen Geschwistern aufgewachsen. Und er wurde ein Teil der Familie. Der Vater musste hart arbeiten, um seine Familie durchzubringen.

Mira ist aufgewachsen und träumte immer davon, eine Familie mit der Person, die sie geliebt hat, zu gründen. Sie hat geheiratet und wollte Mutter werden, aber ihr Mann war nicht sicher, ob er Kinder von ihr bekommen wollte. Es gab Schwierigkeiten damals, die zur Scheidung führen konnte, aber bald schon darauf hat sie ein Kind erwartet. Das Paar haben viel versucht die Schwierigkeiten zu lösen, aber sie schafften das nicht, deshalb haben sie getrennt. Sie haben aber das gemeinsame Sorgerecht erhalten.

Figure 1

Screenshots from the Dialogue with ChatGPT, Along with Its Feedback on the Students' Translations



Student B:

Maria war ein Glückliches Mädchen, weil sie in einer liebevollen Familie aufwuchs. Sie war das Jüngste Mädchen in ihrer vierköpfigen Familie und sie liebte ihre Eltern sehr. Nach ihrer Geburt ihr Vater adoptierte Kind seines Freundes, nachdem seine Eltern bei einem Unfall gestorben sind. Das Kind hatte im Land keine enge Verwandten .

Das Kind wuchs auf bei seinen Brüdern und wurde ein Teil von Familie. Der Vater musste zu viel arbeiten um seine Familie unterstützen zu können. Mira ist groß geworden und träumte eine Familie zu gründen mit der Person, der sie liebte. Sie heiratete und wollte Mutter aber ihr Mann war nicht sicher ob er ein gemeinsames Kind bekommen will. Es gab Schwierigkeiten, die zu einer Scheidung führen könnten.

Doch schon bald erwartete Maria ihr erstes Kind. Das Paar versuchte, die Probleme zu überwinden aber das funktioniert nicht und sie trennten sich. Aber Das Paar erhielten ein gemeinsame Sorgerecht für ihr Kind.

Figure 2

Screenshots from the Dialogue with ChatGPT, Along with Its Feedback on the Students' Translations



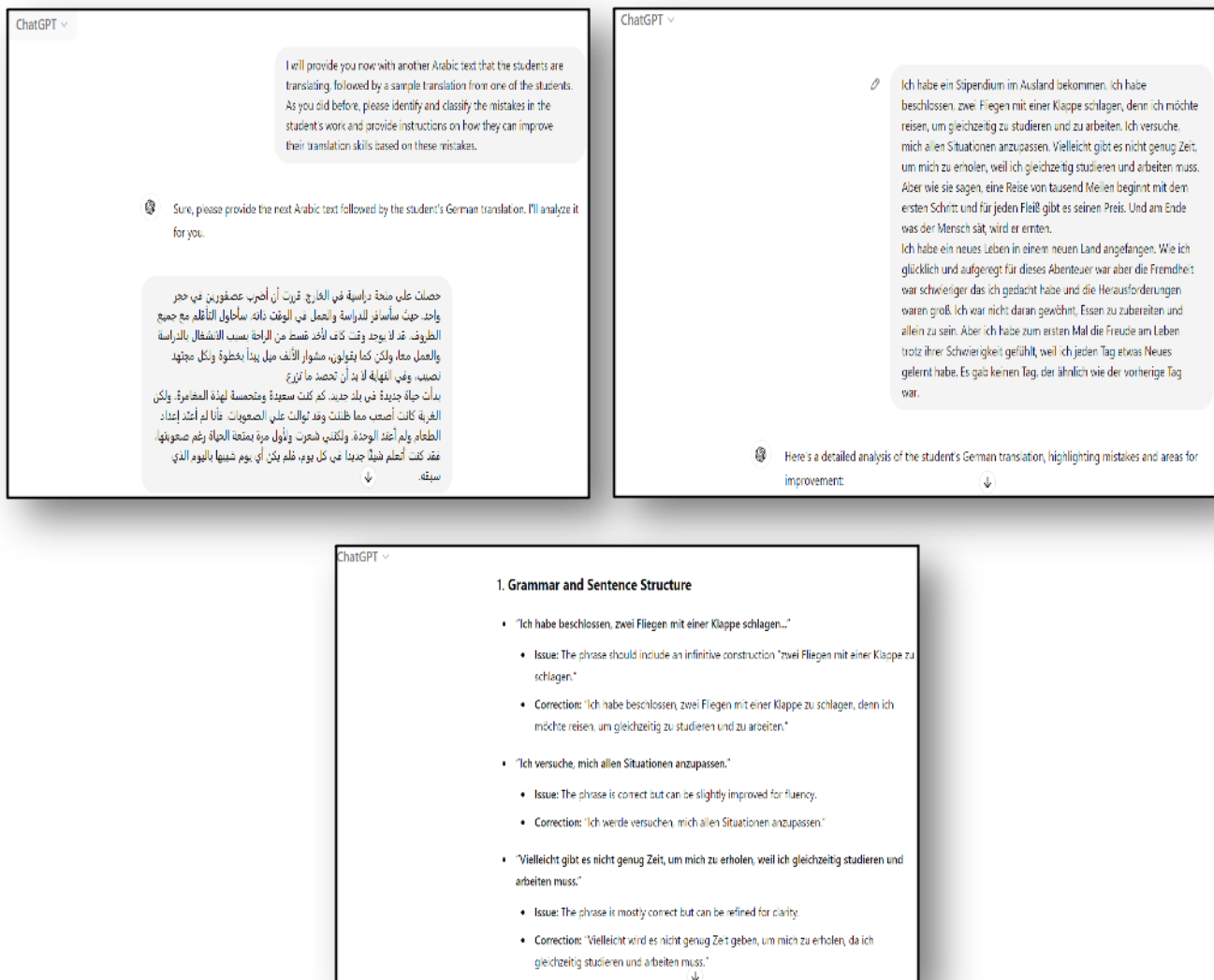
Translation Samples for Arabic Text No. 2

Student A:

Ich habe ein Stipendium im Ausland bekommen. Ich habe beschlossen, zwei Fliegen mit einer Klappe schlagen, denn ich möchte reisen, um gleichzeitig zu studieren und zu arbeiten. Ich versuche, mich allen Situationen anzupassen. Vielleicht gibt es nicht genug Zeit, um mich zu erholen, weil ich gleichzeitig studieren und arbeiten muss. Aber wie sie sagen, eine Reise von tausend Meilen beginnt mit dem ersten Schritt und für jeden Fleiß gibt es seinen Preis. Und am Ende was der Mensch sät, wird er ernten. Ich habe ein neues Leben in einem neuen Land angefangen. Wie ich glücklich und aufgeregt für dieses Abenteuer war aber die Fremdheit war schwieriger das ich gedacht habe und die Herausforderungen waren groß. Ich war nicht daran gewöhnt, Essen zu zubereiten und allein zu sein. Aber ich habe zum ersten Mal die Freude am Leben trotz ihrer Schwierigkeit gefühlt, weil ich jeden Tag etwas Neues gelernt habe. Es gab keinen Tag, der ähnlich wie der vorherige Tag war.

The student has demonstrated progress in several areas, including verb separation, verb conjugation, tense consistency, capitalization, accurate interpretation of the original Arabic text, and proper use of idiomatic expressions that convey the intended meaning, as guided by the instructor. However, persistent errors still require attention, particularly in the handling of infinitive and relative clauses, article and gender agreement, correct pronoun usage, awkward sentence constructions, the selection of appropriate prepositions, and the comprehension of contextual vocabulary.

Figure 3
Screenshots from the Dialogue with ChatGPT, Along with Its Feedback on the Students' Translations



It is important to emphasize that not every correction made by ChatGPT is necessarily valid or accurate. The instructor continues to play the most critical role in the teaching process by providing guidance to the students. This is evident, for example, in the following points from ChatGPT's feedback on Student A's translation:

Figure 4
ChatGPT's Feedback 1 on Student A's Translation

- "Aber wie sie sagen, eine Reise von tausend Meilen beginnt mit dem ersten Schritt und für jeden Fleiß gibt es seinen Preis."
 - **Issue:** Capitalize "sie" as it refers to a saying or quote.
 - **Correction:** "Aber wie sie sagen, eine Reise von tausend Meilen beginnt mit dem ersten Schritt, und für jeden Fleiß gibt es seinen Preis."

In this sentence, ChatGPT interpreted the pronoun "sie" as referring to a person who expressed the following idiomatic phrases. However, this was a literal translation from the Arabic text ("كما يقولون"). A more accurate correction would be to use phrases such as "wie man sagt" or "wie gesagt," which better convey the intended meaning in the original Arabic sentence.

This example illustrates a broader limitation: AI lacks the inferential and pragmatic competence that human translators and educators develop over time. From a psycholinguistic standpoint, these inaccuracies have critical implications for learners. Overreliance on AI-generated output can lead to the reinforcement of incorrect syntactic or semantic mappings, especially if students are not equipped to critically evaluate the suggestions provided by the tool. This may inadvertently impede the internalization of correct language patterns or distort learners' interlanguage development. Furthermore, the seeming authority of ChatGPT's responses may discourage students from questioning or challenging incorrect outputs, potentially diminishing their metalinguistic awareness and critical engagement with the translation process. Therefore, while ChatGPT serves as a valuable supplementary tool, its role must remain secondary to the instructor's pedagogical judgment. The human instructor is essential not only for correcting AI's mistakes but also for modeling how to interpret, critique, and learn from those mistakes – a process central to both translation competence and psycholinguistic development.

In this sentence, ChatGPT failed to correct the preposition used with the phrase "aufgeregt sein" and instead produced a literal translation from the Arabic text ("...لهذه المغامرة"). The correct preposition in this construction should be "über" or "auf," depending on the context, to accurately convey the meaning.

Figure 5
ChatGPT's Feedback 2 on Student A's Translation

- "Wie ich glücklich und aufgeregt für dieses Abenteuer war aber die Fremdheit war schwieriger das ich gedacht habe..."
 - Issue: The sentence structure is awkward. "Wie ich glücklich und aufgeregt für dieses Abenteuer war" should be "Wie glücklich und aufgeregt ich für dieses Abenteuer war," and "das" should be "als."
 - Correction: "Wie glücklich und aufgeregt ich für dieses Abenteuer war, aber die Fremdheit war schwieriger als ich gedacht hatte..."

This example underscores one of the common limitations of AI-assisted translation tools: their tendency to adhere too closely to the structure of the source language without adequately accounting for the grammatical and idiomatic norms of the target language. Such inaccuracies highlight the ongoing need for human oversight in classroom settings, where instructors must step in to clarify and correct these subtle but important errors that may otherwise go unnoticed by learners.

Student B:

Ich habe ein Stipendium im Ausland bekommen. Ich entschied mich zwei Fliegen mit einer Klappe zu schlagen, denn werde ich gleichzeitig studieren und arbeiten. Ich versuche mit aller Situationen anpassen. Ich weiß, dass ich nicht genug Zeit mich zu erholen, weil ich mit Studium und Arbeit sehr beschäftigt sein werde. Aber wie sie sagen eine Reise von tausend Meilen beginnt mit dem ersten Schritt. Endlich was der Mensch sät wird ernten.

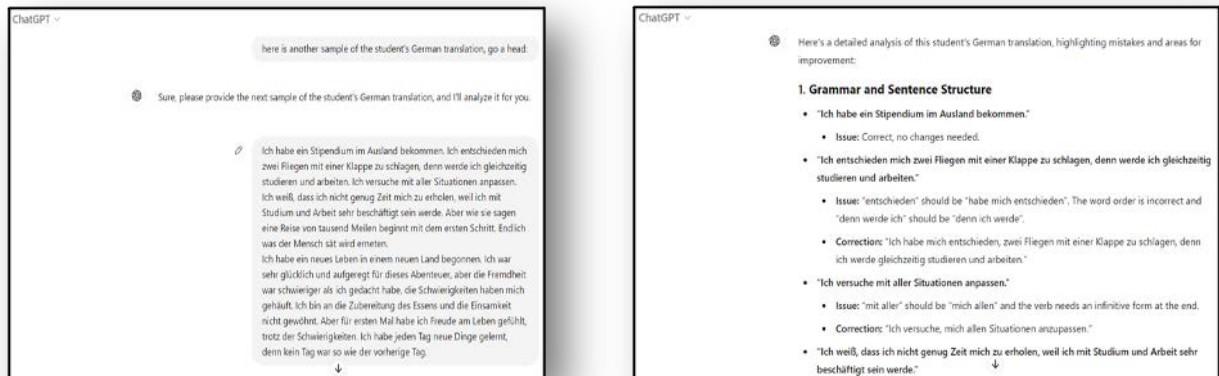
Ich habe ein neues Leben in einem neuen Land begonnen. Ich war sehr glücklich und aufgeregt für dieses Abenteuer, aber die Fremdheit war schwieriger als ich gedacht habe, die Schwierigkeiten haben mich gehäuft. Ich bin an die Zubereitung des Essens und die Einsamkeit nicht gewöhnt. Aber für ersten Mal habe ich Freude am Leben gefühlt, trotz der Schwierigkeiten. Ich habe jeden Tag neue Dinge gelernt, denn kein Tag war so wie der vorherige Tag.

The student has demonstrated improvement in several areas, including correct verb conjugation, appropriate tense usage and consistency, capitalization, mostly accurate sentence structure, correct relative clauses, and generally effective paraphrasing of the original Arabic meaning. However, further progress is needed in specific aspects such as the use of infinitive clauses, correct verb forms, awareness and proper use of reflexive verbs, selection of appropriate prepositions, conjunction and verb agreement, avoiding awkward expressions that may cause ambiguity, understanding contextual vocabulary,

and the correct application of punctuation and idiomatic expressions within context.

Figure 6

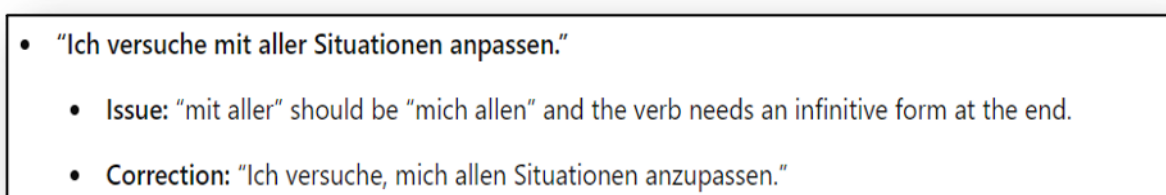
Screenshots from the Dialogue with ChatGPT, Along with Its Feedback on the Students' Translations



This feedback from ChatGPT also contains some corrections that are not necessarily accurate or valid, and may even confuse the student, who would then require the instructor's assistance. For example, see Fig. 7.

Figure 7

ChatGPT's Feedback 1 on Student B's Translation



In most instances, ChatGPT corrects grammar without providing an explanation of the rule or specifying the grammatical case, as demonstrated in this sentence. It corrected the noun "Situationen" from "aller" to "allen" without clarifying that the reflexive verb "sich anpassen" requires a dative object and that the reflexive pronoun should be in the accusative case, which is why "mich" was added. Furthermore, ChatGPT noted the need for an infinitive verb at the end of the sentence but did not specify which verb it was referring to, whether "versuchen" or "anpassen."

Figure 8
ChatGPT's Feedback 2 on Student B's Translation

- "Ich weiß, dass ich nicht genug Zeit mich zu erholen, weil ich mit Studium und Arbeit sehr beschäftigt sein werde."
 - **Issue:** The sentence is mostly correct but should be refined. "nicht genug Zeit mich zu erholen" should be "nicht genug Zeit haben, mich zu erholen".
 - **Correction:** "Ich weiß, dass ich nicht genug Zeit haben werde, mich zu erholen, weil ich mit Studium und Arbeit sehr beschäftigt sein werde."

ChatGPT deemed this sentence mostly correct and initially added only the infinitive verb "haben" (under "Issue"), omitting the auxiliary verb "werde," which is crucial for forming the future tense in German. Later, under "Correction," the auxiliary verb was included. This approach to correction could confuse the student, requiring the instructor's intervention and guidance for clarification.

Translation Samples for Arabic Text No. 3

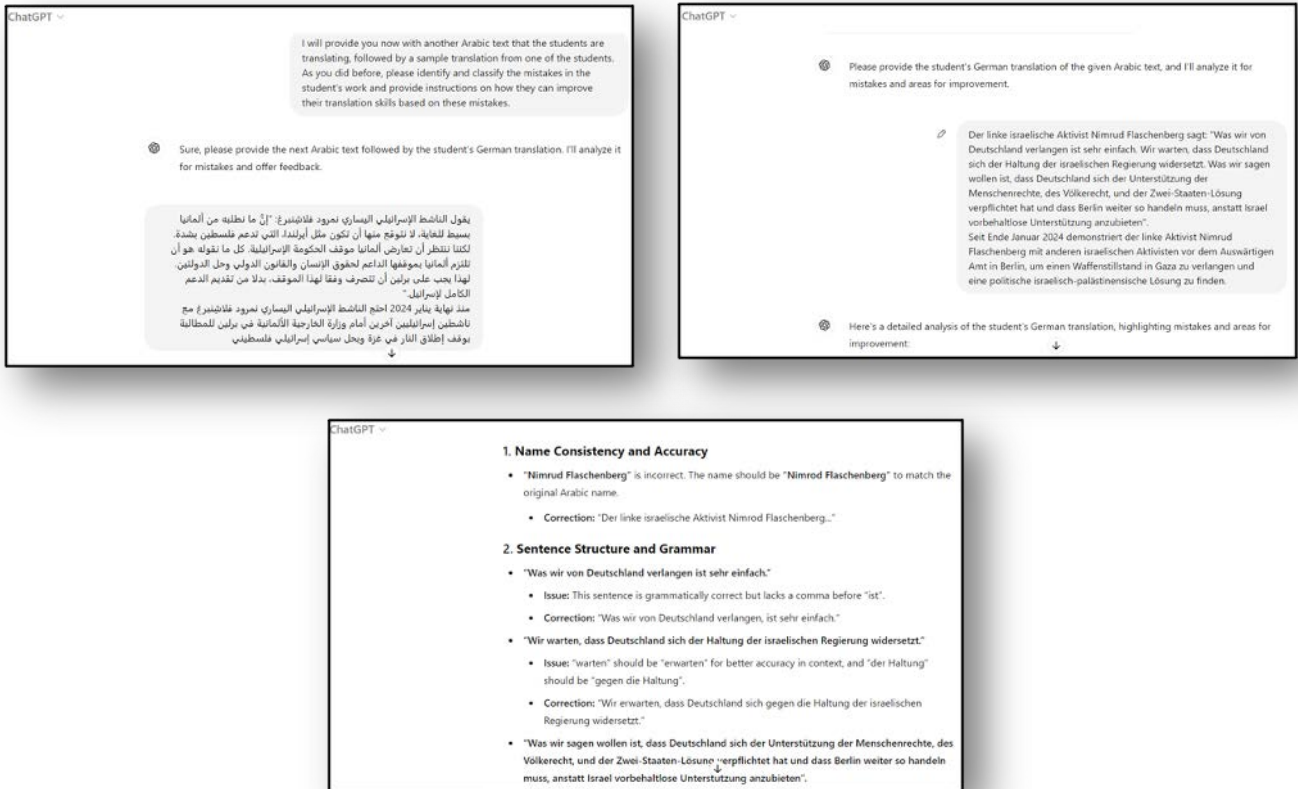
Student A:

Der linke israelische Aktivist Nimrud Flaschenberg sagt: "Was wir von Deutschland verlangen ist sehr einfach. Wir warten, dass Deutschland sich der Haltung der israelischen Regierung widersetzt. Was wir sagen wollen ist, dass Deutschland sich der Unterstützung der Menschenrechte, des Völkerechts, und der Zwei-Staaten-Lösung verpflichtet hat und dass Berlin weiter so handeln muss, anstatt Israel vorbehaltlose Unterstützung anzubieten".

Seit Ende Januar 2024 demonstriert der linke Aktivist Nimrud Flaschenberg mit anderen israelischen Aktivisten vor dem Auswärtigen Amt in Berlin, um einen Waffenstillstand in Gaza zu verlangen und eine politische israelisch-palästinensische Lösung zu finden.

Overall, the student has demonstrated significant improvement across several areas by the end of the semester, including correct use of tenses and verb forms, maintaining tense consistency, mostly accurate verb-case agreement, proper capitalization, generally correct sentence structure, accurate infinitive clauses, awareness of reflexive verbs and their appropriate use in context, correct prepositions, and mostly effective interpretation and paraphrasing of the original Arabic meaning. However, some persistent errors still require the student's attention to further enhance the quality of the translation, such as incorrect spelling of names and words, improper punctuation, and the selection of more precise words and verbs for clarity and accuracy.

Figure 9
Screenshots from the Dialogue with ChatGPT, Along with Its Feedback on the Students' Translations



One inaccurate correction in ChatGPT's evaluation of this translation can be identified in the following sentence (see Fig. 10):

Figure 10
ChatGPT's Correction on Student A's Translation

- "Wir warten, dass Deutschland sich der Haltung der israelischen Regierung widersetzt."
 - Issue: "warten" should be "erwarten" for better accuracy in context, and "der Haltung" should be "gegen die Haltung".
 - Correction: "Wir erwarten, dass Deutschland sich gegen die Haltung der israelischen Regierung widersetzt."

In this sentence, ChatGPT identified the grammatical case used with the reflexive verb "sich widersetzen" in the phrase "der Haltung" (dative case) as an error and replaced it with the preposition "gegen" (accusative case). However,

both cases are correct, as the verb "sich widersetzen" can be used with either the dative or accusative case, depending on the context.

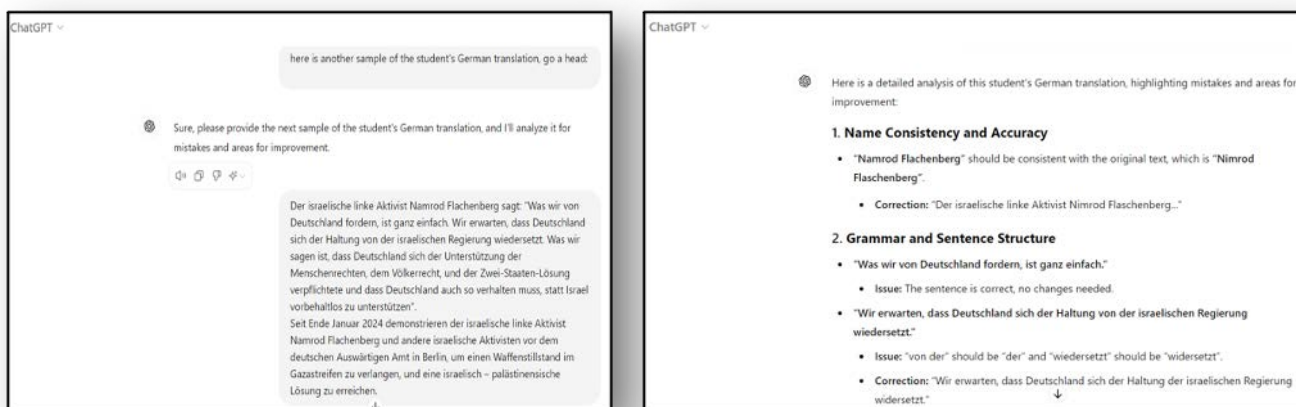
Student B:

Der israelische linke Aktivist Namrod Flachenberg sagt: "Was wir von Deutschland fordern, ist ganz einfach. Wir erwarten, dass Deutschland sich der Haltung von der israelischen Regierung widersetzt. Was wir sagen ist, dass Deutschland sich der Unterstützung der Menschenrechten, dem Völkerrecht, und der Zwei-Staaten-Lösung verpflichtete und dass Deutschland auch so verhalten muss, statt Israel vorbehaltlos zu unterstützen".

Seit Ende Januar 2024 demonstrieren der israelische linke Aktivist Namrod Flachenberg und andere israelische Aktivisten vor dem deutschen Auswärtigen Amt in Berlin, um einen Waffenstillstand im Gazastreifen zu verlangen, und eine israelisch – palästinensische Lösung zu erreichen.

Figure 11

Screenshots from the Conducted Dialogue with ChatGPT and Its Feedback On The Student's Translation



This student has also shown a good improvement in many language aspects such as: mostly correct use of tenses and verb forms, maintaining tense consistency, correct capitalization, mostly correct sentence structure, correct infinitive clauses, correct prepositions, better choosing of appropriate words and verbs, and good paraphrasing of the original meaning in Arabic. Some remaining mistakes like the incorrect spelling of names and words, incorrect punctuation and unawareness of genitive case and reflexive verbs still need more work on it.

Figure 12
ChatGPT's Incorrect Choice 1 on Student B's Translation

- "Was wir sagen ist, dass Deutschland sich der Unterstützung der Menschenrechten, dem Völkerrecht, und der Zwei-Staaten-Lösung verpflichtete und dass Deutschland auch so verhalten muss, statt Israel vorbehaltlos zu unterstützen."
 - Issue: "Menschenrechten" should be "Menschenrechte", "verpflichtete" should be "verpflichtet hat", "verhalten" should be "verhält", and "statt Israel vorbehaltlos zu unterstützen" should be "anstatt Israel vorbehaltlos zu unterstützen". Commas should also be removed after "Völkerrecht".
 - Correction: "Was wir sagen ist, dass Deutschland sich der Unterstützung der Menschenrechte, des Völkerrechts und der Zwei-Staaten-Lösung verpflichtet hat und dass Deutschland sich auch so verhalten muss, anstatt Israel vorbehaltlos zu unterstützen."

ChatGPT incorrectly corrected the grammatical case of the word "die Menschenrechte" by removing the "-n" ending, even though the student had used it correctly in the plural dative case and added the "n." Notably, ChatGPT had previously done the opposite in evaluating an earlier translation, where it correctly changed the word to "Menschenrechten." Furthermore, in the "issue" section, ChatGPT failed to indicate that the verb "verhalten" in this context is reflexive, instead offering an incorrect correction before conjugating it correctly in the "correction" section.

Figure 13
ChatGPT's Incorrect Choice 2 on Student B's Translation

- "Wir erwarten, dass Deutschland sich der Haltung von der israelischen Regierung widersetzt."
 - Issue: "von der" should be "der" and "widersetzt" should be "widersetzt".
 - Correction: "Wir erwarten, dass Deutschland sich der Haltung der israelischen Regierung widersetzt."

In the previous translation, ChatGPT overlooked the dative complement required by the verb "sich widersetzen" and instead replaced it with the preposition "gegen" (accusative case). However, it did not label this as an error in the current translation. This inconsistency and lack of accuracy highlight that ChatGPT cannot be fully relied upon and underscores the necessity of the instructor's guidance. Such inconsistencies could potentially confuse the student if the teacher does not intervene.

Post-Test Results

Results of the Experimental Group

Following the use of ChatGPT as a tool for teaching translation to the experimental group over a 15-week semester, a post-test was administered to both groups to evaluate the effectiveness of this approach in enhancing the translation skills of the experimental group. The test also aimed to determine whether there were any significant differences between the experimental group and the control group, who continued to learn translation through traditional methods. The post-test consisted of 10 sentences that participants were required to translate from Arabic into German. This section presents a sample of the test results from the experimental group, focusing on the same two students whose progress in translation over the semester, after integrating ChatGPT into the course, was previously documented. Subsequently, a sample of the control group's results will also be presented. Please note that the students' mistakes are underlined in the tables.

Table 1
Post-Test Experimental Group Samples for the Two Students

No	Sentence in Arabic	Translation into German	
		Student A	Student B
1	قررت أخذ إجازة طويلة لكي أرتاح من ضغط العمل.	Ich habe beschlossen, einen langen Urlaub zu machen, um mich vom Stress der Arbeit zu erholen.	Ich habe beschlossen, eine lange Pause zu machen, so kann ich mich von dem Arbeitsstress erholen.
2	مشوار الألف ميل يبدأ بخطوة، لذا حاول أن تتأقلم في بيئتك الجديدة.	Eine Reise von tausend Meilen beginnt mit dem ersten Schritt, deshalb versuchen Sie, sich der neuen Umgebung anzupassen.	Eine Reise von tausend Meilen beginnt mit dem ersten Schritt, so versuchen Sie an Ihrem neuen <u>Haus</u> zu gewöhnen.
3	في بداية الأمر يشعر المرء بالوحدة ولكنه سرعان ما ينشغل بتحديات الحياة التي تتوالى.	Am Anfang fühlt man sich einsam, aber dann ist man schnell mit den Herausforderungen des Lebens <u>beschäftigt</u> , die <u>häufen</u> .	Am Anfang fühlt man die Einsamkeit, aber danach wird man mit den Schwierigkeiten des Lebens <u>beschäftigt</u> .

4	وصل سعرالفضة الى أعلا مستوياته خلال الأسبوع المنصرم.	Der Silberpreis ist innerhalb der letzten Woche durch die Decke gegangen.	In letzter Woche hat der Silberpreis ein neues Rekordhoch erreicht.
5	المكمور ة، طبق شعبي تراثي محبوب من شمال الأردن.	Almakmurah ist ein volkstümliches traditionelles Gericht, das im Norden von Jordanien <u>verliebt</u> ist.	Makmurah ist ein <u>volkstümliche</u> geliebtes Gericht im norden des Jordaniens.
6	تتميز المكمورة عن باقي الأطباق الشعبية باستخدام الكثير من زيت الزيتون والبصل.	Almakmurah unterscheidet sich von den anderen volkstümlichen Gerichten in der viel Verwendung von Öl und Zwiebel.	Makmurah unterscheidet sich von anderen Gerichten, es wird viel Öl und Zwiebel verwendet.
7	افتتحت الأم محل بقالة لإعالة أسرته.	Die Mutter hat ein Lebensmittelgeschäft eröffnet, um ihre Familie zu ernähren.	Die Mutter hat ein Geschäft <u>geöffnet</u> , so kann sie ihre Familie ernähren.
8	بعد وفاة والديه ، قامت العمة بتبني الطفل الصغير.	Nach dem Tod seiner Eltern hat die Tante das Kind adoptiert.	Nach dem Tod seiner Eltern hat die Tante den Jungen adoptiert.
9	يمكن أن تؤدي أسباب مختلفة إلى الطلاق.	Verschiedene Gründe können zur Scheidung führen.	Es gibt verschiedene Gründe, die zur Scheidung führen können.
10	تمت دعوة الأقارب من الدرجة الأولى فقط لحضور حفل الزواج.	Nur die engsten Verwandten wurden zur Hochzeit eingeladen.	Nur die engsten Verwandten wurden zur Eheschließung eingeladen.

The post-test results overall demonstrated a significant improvement in the translation skills from Arabic to German among participants in the experimental group, compared to their performance in the pre-test. As evidenced by the sample translations from students A and B, there is a noticeable enhancement in sentence structure, grammatical accuracy, the

selection of appropriate vocabulary, and the translation of collocations and idioms – key challenges identified in the pre-test.

As expected, some minor linguistic errors persist, which is typical for students learning German as a foreign language in their third year. Among the recurrent errors noted in the samples, which can be regarded as an integral part of the language learning process, are grammatical errors such as the incorrect declension of adjectives. For instance, in student A's translation of example 1 (*lange* was used instead of *langen*) and in student B's translation of example 5 (*volkstümliche* was used instead of *volkstümliches*). Additionally, there was incorrect usage of some reflexive verbs, such as omitting the reflexive pronoun (*sich*) associated with the verb, as seen in student A's translation of example 3 with *sich häufen*.

Another linguistic error involved the confusion between the words *verliebt* and *beliebt* in student A's translation of example 5. *Verliebt* was incorrectly used to mean something desirable or liked, whereas it actually refers to someone who has fallen in love with another person. The same mistake was repeated by student B in the translation of example 7, where the student confused the verb *öffnen* (meaning "to open") with *eröffnen* (meaning "to inaugurate" or "to launch"), which is the intended meaning in the original Arabic sentence.¹

Results of the Control Group

As demonstrated in the sample provided below for students A and B in the control group, a modest improvement in translation skills was observed in the post-test results. This included mostly correct article and noun agreement, improved orthography, and some progress in verb conjugation. Despite this slight progress, many language errors persisted in sentence translations, including mostly grammatical errors (GE) such as incorrect verb forms, incorrect prepositions or sentence structures. Lexical errors (LE) such as inappropriate word choices or confusion with similar-sounding words, and idiomatic errors (IE) were also noted. This gradual improvement aligns with the expected outcome of a translation course supervised by an instructor, aimed at teaching translation skills. However, when comparing the post-test

¹ It is interesting to note student B's translation of example 2, where the phrase *Ihrem neuen Haus* was used to convey the meaning of "the new environment" in the original Arabic sentence. Although the usage was not entirely correct, as *Zuhause* would have been more appropriate than *Haus* to deliver the intended meaning, it can be said that the student did not resort to literal translation. Instead, he attempted to use a different construction to convey an equivalent meaning, implying that a person's new environment is like a new home with which they must adapt.

In example 3, both students used the adjective *beschäftigt* to convey the intended meaning in the Arabic sentence, which refers to being preoccupied with life's problems. This translation can be considered somewhat literal, and it would be preferable to replace it with the word *konfrontiert* in the construction *mit etwas konfrontiert sein oder werden*, meaning "to be faced with something."

results of the two groups, it is evident that students in the control group who were not taught using ChatGPT in translation continued to repeat various errors, while their peers in the experimental group showed a comparatively higher level of improvement.

Table 2
Post-Test Results Samples for Students A and B in the Control Group²

No.	Sentence in Arabic	Translation into German	
		Student A	Student B
1	قررت أخذ إجازة طويلة لكي أرتاح من ضغط العمل.	Ich <u>nahm</u> einen <u>langen</u> Urlaub, damit kann ich <u>von Arbeitsstress ruhen</u> .	Ich habe <u>eine</u> <u>langen</u> Urlaub <u>geschlossen</u> , damit ich Ruhe <u>haben</u> von <u>Arbeitsdruck</u> <u>kann</u> .
2	مشوار الألف ميل يبدأ بخطوة، لذا حاول أن تتأقلم في بيتك الجديدة.	Der Weg von tausend Meilen beginnt mit <u>seinem</u> Schritt, so versuchen Sie in <u>seinem</u> neuen Leben <u>zusammenzuleben</u> .	Die lange Reise beginnt mit dem <u>erste</u> Schritt, dafür in <u>Ihren</u> <u>neue</u> Platz <u>aufpassen</u> <u>versuche</u> .
3	في بداية الأمر يشعر المرء بالوحدة ولكنه سرعان ما ينشغل بتحديات الحياة التي تتوالى.	Am Anfang hat man Alleinsamkeit Gefühle, aber man wird schnell mit <u>der</u> <u>folgenden</u> Schwierigkeiten <u>das</u> Leben <u>beschäftigt</u> .	Am Anfang fühlt man die Einsamkeit, aber er <u>beschäftigt</u> mit der <u>Verfolgung</u> Schwierigkeiten.
4	وصل سعر الفضة الى أعلا مستوياته خلال الأسبوع المنصرم.	Der Silberpreis <u>hat in die</u> <u>letzte</u> Woche <u>durch die</u> <u>Decke</u> erreicht.	Das Silber hat <u>durch</u> <u>die</u> <u>strenge</u> <u>Woche</u> <u>höchste</u> <u>Wertigkeit</u> erreicht.
5	المكمورة، طبق شعبي تراثي محبوب من شمال الأردن.	Makmura ist ein <u>angenehm</u> <u>volkstümliche</u> Gericht im Norden von Jordanien.	Makmura ist ein traditionelles Gericht, <u>dass</u> <u>verliebt</u> im Norden von Jordanien.
6	تتميز المكمورة عن باقي الأطباق الشعبية باستخدام الكثير من	Makmura hat viele Zwiebeln und Olivenöl, das macht es besonders <u>auf</u> <u>die</u> <u>andere</u>	Makmura <u>unterscheidet</u> <u>von</u> den anderen traditionellen Gerichten, dass es viele

² Errors are marked in red.

	الزيتون والبصل.	زيت	<u>Volksgerichte.</u>	Olivenöl und Zwiebeln <u>benutzt.</u>
7	افتتحت الأم محل بقالة لإعالة أسرتها.		Die Mutter <u>öffnet</u> ein Market, um ihre Familie zu <u>unterstützung.</u>	Die Mutter <u>geöffnet</u> ein Geschäft, um ihre Familie <u>durchbringen.</u>
8	بعد وفاة والديه ، قامت العممة بتبني الطفل الصغير.		<u>Nach dem ihre Eltern Tod,</u> die Tante hat <u>einen</u> Jungen <u>adoptieren.</u>	Nach <u>sein Eltern Tod,</u> hat die Tante ein kleines Kind <u>adoptieren.</u>
9	يمكن أن تؤدي أسباب مختلفة إلى الطلاق.		<u>Unterschiede Gründe kann</u> zur Scheidung führen.	Viele <u>Begründen ist</u> zur Scheidung führen.
10	تمت دعوة الأقارب من الدرجة الأولى فقط لحضور حفل الزواج.		Die Einladung <u>war engste</u> Verwandte.	Nur engste Verwandte wurden zur <u>Erschließung</u> <u>eingeladet.</u>

The findings of this study unequivocally demonstrate that students in the experimental group, who leveraged ChatGPT as a pedagogical tool, significantly surpassed their counterparts in the control group, who were instructed through traditional methodologies. The experimental group exhibited marked improvements in diverse facets of translation, encompassing sentence structure, grammatical accuracy, lexical choices, and the precise rendering of idiomatic expressions. In contrast, students in the control group displayed only limited progress, as their post-test results closely paralleled those obtained in the pre-test, revealing persistent linguistic errors, particularly in grammar and idiomatic usage. These outcomes underscore the efficacy of ChatGPT in augmenting translation skills relative to conventional teaching approaches.

Discussion

The results of this study reveal significant differences in the translation skills of students in the experimental group, who used ChatGPT as a teaching tool, compared to those in the control group, who followed traditional methods. This outcome underscores the potential of AI-assisted learning tools in enhancing students' linguistic capabilities, particularly in the domain of translation. The students in the experimental group demonstrated improvements in several areas, such as sentence structure, grammatical accuracy, vocabulary choice, and the ability to translate idiomatic expressions.

These advancements suggest that ChatGPT facilitated a more interactive and targeted learning process, enabling students to receive immediate feedback on their translations, which likely helped them refine their skills throughout the semester. The ability of ChatGPT to provide instant, detailed feedback on errors, along with suggestions for improvement, allowed students to actively engage with the translation process and address their mistakes in real-time. This personalized feedback mechanism is a key factor contributing to the observed progress in the experimental group.

On the other hand, the control group, which did not have access to ChatGPT, showed a slight improvement in their post-test results. Despite having the same period of instruction, these students maintained a level of performance consistent with their pre-test, with minimal reduction in errors. This result implies that traditional teaching methods, although effective to some extent, may not provide the same level of individualized and timely support as AI-based tools like ChatGPT. The minor and slow progress in the control group highlights the limitations of conventional learning approaches, particularly in terms of providing immediate, adaptive feedback and promoting sustained engagement with the translation process.

Moreover, the improvements observed in the experimental group can be attributed to the specific strengths of ChatGPT as a tool. ChatGPT's ability to evaluate translations on multiple levels—grammar, vocabulary, sentence structure, and idiomatic accuracy—enabled students to identify and correct their mistakes in a more comprehensive manner. For example, in areas such as verb conjugation, tense consistency, and article-noun agreement, students were able to refine their understanding through feedback that highlighted the nature of their errors and offered corrective suggestions. This iterative learning process facilitated a deeper grasp of the nuances of German grammar, which is often a challenge for learners at intermediate levels. Additionally, the AI's feedback on idiomatic expressions and lexical choices helped students understand how to preserve meaning while making appropriate linguistic adjustments, a skill crucial in high-quality translation.

While the experimental group demonstrated notable advancements, it is important to acknowledge that some linguistic errors persisted even after the integration of ChatGPT. Errors related to adjective endings, and reflexive verbs were still prevalent, which is expected for third-year learners of German as a foreign language. However, these errors were less frequent and less impactful compared to those observed in the pre-test, indicating that the students were making meaningful progress. The persistence of certain errors can be attributed to the complex nature of these grammatical structures, which require continued practice and exposure. ChatGPT, while a powerful tool, is not a panacea for all

language learning challenges, and consistent human guidance remains essential for addressing more intricate aspects of language acquisition.

In contrast, the control group's consistent failure to achieve a notable improvement points to the importance of individualized feedback in the learning process. The lack of significant progress among these students suggests that traditional methods may not always cater to the diverse learning needs of students, especially in subjects as complex as translation. The results highlight the potential of AI-assisted learning tools to offer tailored, real-time feedback that can accelerate learning and provide students with opportunities to self-correct and grow. Without such support, the students in the control group may have struggled with self-directed learning and missed out on crucial opportunities for improvement. This observation suggests that incorporating AI-based tools into language instruction can address some of the limitations of traditional methods and enhance the overall effectiveness of language teaching.

The findings of this work are consistent with the recent literature which underscores the growing significance of AI-powered tools like ChatGPT in assisting with translation tasks, particularly in academic settings where they have shown considerable promise in improving translation and teaching quality and student performance (Yuan et al., 2024). Studies demonstrate that AI models, particularly large language models (LLMs), offer substantial advantages when integrated into educational settings for translation training. This is evident in a comparative study where students using ChatGPT significantly outperformed their peers in the control group, reflecting the positive impact of such tools on learners' linguistic accuracy and comprehension (see Lyu et al., 2023).

AI tools, such as ChatGPT, not only aid in generating initial translations but also facilitate the refinement of translations through iterative feedback and correction. This aligns with the increasing trend towards "interactive machine translation" (IMT), where students can compare their work against AI-generated outputs, identify errors, and learn from the adjustments suggested by the tool. The feedback mechanism provided by LLMs, especially in identifying lexical errors, syntactic mismatches, and idiomatic inaccuracies, contributes to better learning outcomes (see Lyu et al., 2023). This is particularly important in translation pedagogy, where real-time error correction fosters a deeper understanding of language nuances, which students may otherwise miss.

Moreover, AI-powered tools like ChatGPT help bridge the gap between the student's current proficiency and the expected standards of accuracy in translation tasks. This is essential for improving confidence in translating complex texts, as evidenced by the enhanced performance of students in the experimental group who received guidance from the AI model. Such tools also ensure that students are exposed to diverse and more contextually accurate

translations, fostering a greater sense of linguistic diversity and cultural sensitivity (Muñoz-Basols et al., 2023; Kelly & Bruen, 2015). The success of AI in translation is linked to its capacity for "personalized learning," where models can be adapted to suit individual students' needs, offering customized feedback based on their specific errors and strengths (Limo et al., 2023; Yeşilçınar, 2023; Opara et al., 2023).

The results of this study can be also interpreted through the lens of psycholinguistics, particularly in relation to language comprehension and production, which are central processes in translation. According to Kasap and Ünsal (2024), language processing involves intricate mental operations whereby input in the source language must be decoded (comprehension) and then recoded into the target language (production). The consistent and marked improvement in the experimental group's translation performance suggests that the integration of ChatGPT as a pedagogical tool may facilitate more effective semantic and syntactic mapping. This aligns with psycholinguistic models that view translation as a bidirectional cognitive activity requiring robust lexical retrieval and structural reorganization in real time.

Furthermore, the real-time corrective feedback offered by ChatGPT supports students in identifying and rectifying mismatches between their internal linguistic representations and the expected target structures. As observed in the present study, students began to more accurately anticipate grammatical structures and lexical collocations, indicating a refinement in their mental encoding mechanisms. Kasap (2025) emphasizes the role of technological tools in shaping how learners internalize translation norms and linguistic patterns, noting that AI-driven environments may recalibrate the traditional cognitive processes involved in L2 translation. The improvement seen across the 15-week intervention supports this claim, as students gradually reduced errors related to syntax and word choice, often difficult aspects of production in psycholinguistic terms.

In addition to production-oriented gains, ChatGPT appears to have alleviated some of the extraneous cognitive load typically associated with translation, a key concept in Cognitive Load Theory. According to Kasap and Ünsal (2024), when AI tools handle low-level, routine linguistic tasks—such as identifying verb tense errors or suggesting more natural phrasings—students are able to redirect their working memory toward more complex linguistic analysis, such as handling figurative language, idiomatic expressions, or cross-cultural nuances. This was evident in the students' post-test translations, where fewer mechanical errors were observed and more contextually appropriate lexical and syntactic choices were made. Psycholinguistically, this suggests more efficient

allocation of cognitive resources, allowing deeper engagement with meaning-making rather than surface-level form correction.

Finally, the psycholinguistic implications of AI in translation extend beyond mechanics to the affective and metacognitive domains, areas also discussed by Kasap (2025). Students' reflections indicated that ChatGPT not only enhanced their confidence but also encouraged them to reflect more critically on their translation strategies. This aligns with the Noticing Hypothesis, which posits that awareness of language discrepancies is essential for learning. By juxtaposing their output with ChatGPT's feedback, learners were prompted to notice gaps in their comprehension and production, fostering greater metalinguistic awareness. The documentation of this interaction, including screenshots and revision trails, provides empirical evidence that ChatGPT facilitates a more active engagement with linguistic input—thus reinforcing cognitive processes fundamental to psycholinguistic theory.

However, while the pedagogical benefits of ChatGPT are evident, its integration into translation instruction also raises serious concerns that warrant critical reflection. As Kasap (2025) warns, AI tools may inadvertently undermine learning autonomy by encouraging overreliance on automated suggestions, thereby weakening learners' ability to make independent linguistic judgments. This overdependence can hinder the development of deep cognitive processing—an essential aspect of psycholinguistic growth in second language acquisition and translation. Furthermore, the alienation of traditional educational relationships, particularly the interactive, dialogic exchange between instructor and student, may dilute the socio-cognitive benefits of classroom-based learning. Ethical challenges are equally pressing; concerns around academic integrity, especially in assessment contexts, arise when AI-generated translations blur the line between assistance and authorship. Moreover, issues related to knowledge security and ideological bias in AI-generated content introduce new layers of complexity. These factors suggest that while ChatGPT can enhance certain cognitive and linguistic processes, its use must be carefully contextualized and pedagogically scaffolded to avoid undermining the very skills it aims to develop.

Conclusion

The aim of this study was to investigate the use of ChatGPT as a teaching tool in enhancing translation skills, specifically in the context of Arabic-to-German translation. We sought to assess whether integrating an AI-powered model, such as ChatGPT, could improve the translation accuracy and overall performance of students compared to traditional methods. The study involved

two groups: an experimental group that used ChatGPT as an assistive tool throughout a 15-week semester and a control group that continued learning through conventional methods. By administering pre- and post-tests, we were able to evaluate the differences in translation proficiency between the two groups.

The findings revealed that the experimental group, which utilized ChatGPT, showed significant improvement in their translation skills compared to the control group. Specifically, the students in the experimental group demonstrated better sentence structure, grammatical composition, appropriate vocabulary selection, and more accurate translation of idioms and collocations. While some minor errors remained, consistent progress was evident throughout the semester. In contrast, the control group exhibited negligible progress between their pre-test and post-test results, highlighting the value of incorporating AI tools in language learning. The use of ChatGPT not only assisted in generating initial translations but also provided real-time corrections, helping students develop a deeper understanding of language nuances and translation techniques.

For future research, it would be beneficial to explore the long-term impact of AI-assisted translation tools on advanced language learners and in more specialized translation fields such as legal, technical, or medical translation. Additionally, further studies could investigate the integration of other AI models, such as domain-specific language models, to see if they provide even greater accuracy and tailored feedback. It would also be insightful to analyze the role of AI in collaboration with human teachers to determine how best to strike a balance between machine assistance and human guidance in translation pedagogy. Finally, research should focus on addressing potential challenges in using AI for language learning, such as the development of students' critical thinking skills and their ability to detect inaccuracies in machine-generated translations.

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References

- Alhabahba, M. M., Pandian, A., & Mahfoodh, O. H. A. (2016). English language education in Jordan: Some recent trends and challenges. *Cogent Education*, 3(1), 1156809. <https://doi.org/10.1080/2331186X.2016.1156809>
- Alomoush, O. I. S., & Al-Na'imat, G. K. (2018). English as the lingua franca in visual touristic Jordan: The case of Petra. *International Journal of Applied Linguistics and English Literature*, 7(4), 1-13. <https://doi.org/10.7575/aiac.ijalel.v.7n.4p.1>
- Al-Saidat, E. (2009). English in Jordan: Attitudes and prestige. *Indian Journal of Applied Linguistics*, 35(2), 155-167.
- Al-Wasy, B. Q., & Mohammed, O. S. M. (2024). Strategies of translating euphemistic expressions from Arabic into English: A comparative study of artificial intelligence models with human translation. 855-826, (40) *مجلة العلوم التربوية و الدراسات الإنسانية*.
- Baker, M. (1992). *In Other Words*. Routledge.
- Baskara, R., & Mukarto, M. (2023). Exploring the implications of CHATGPT for language learning in higher education. *IJELTAL (Indonesian Journal of English Language Teaching and Applied Linguistics)*, 7(2), 343. <https://doi.org/10.21093/ijeltal.v7i2.1387>
- Brynjolfsson, E., Hui, X., & Liu, M. (2019). Does machine translation affect international trade? Evidence from a large digital platform. *Management Science*, 65(12), 5449-5460.
- Fan, P., Gong, H., & Gong, X. (2023). The application of ChatGPT in translation teaching: Changes, challenges, and responses. *International Journal of Education and Humanities*, 11(2), 49-52.
- Fütterer, T., Fischer, C., Alekseeva, A., Chen, X., Tate, T., Warschauer, M., & Gerjets, P. (2023). ChatGPT in education: Global reactions to AI innovations. *Scientific Reports*, 13(1), 15310. <https://doi.org/10.1038/s41598-023-39788-6>
- Hamdan, J. M., & Hatab, W. A. A. (2009). English in the Jordanian context. *World Englishes*, 28(3), 394-405. <https://doi.org/10.1111/j.1467-971X.2009.01607.x>
- Haryanti, D. (2024). Exploring the efficacy factors of ChatGPT in enhancing Indonesian to English translation skills. *Proceeding of The 19th University Research Colloquium 2024: Bidang Pendidikan, Humaniora dan Agama* (216-227).
- Hasan, E., Naqrash, N., & Khabbas, A. K. A. (2025). Teaching Arabic-Korean translation using ChatGPT. *Social Sciences & Humanities Open*, 11, 101484. <https://doi.org/10.1016/j.ssaho.2025.101484>
- Kasap, S. (2025). Psycholinguistic Dynamics in Translation. In Ş. Köktürk Ed., *Linguistics and translation* (pp. 111-118). Akademisyen Kitapevi.
- Kasap, S., & Ünsal, F. (2024). A psycholinguistic study of the bouba-kiki phenomenon: Exploring associations between sounds and shapes. *East European Journal of Psycholinguistics*, 11(1), 84-95. <https://doi.org/10.29038/eejpl.2024.11.1.kas>
- Kelly, N., & Bruen, J. (2015). Translation as a pedagogical tool in the foreign language classroom: A qualitative study of attitudes and behaviours. *Language Teaching Research*, 19(2), 150-168. <https://doi.org/10.1177/1362168814561219>
- Khoshafah, F. (2023). ChatGPT for Arabic-English translation: Evaluating the accuracy. *Research Square*. <https://doi.org/10.21203/rs-2814154/v1>
- Kong, L. (2022). Artificial Intelligence-Based Translation Technology in Translation Teaching. *Computational Intelligence and Neuroscience*, 2022, 1-9. <https://doi.org/10.1155/2022/6016752>
- Lee, T. K. (2023). Artificial intelligence and posthumanist translation: ChatGPT versus the translator. *Applied Linguistics Review*.

- Liao, P. (2010). An analysis of English-Chinese translation errors and its pedagogical applications. *Compilation & Translation Review*, 3(2), 1-10.
- Limo, F. A. F., Tiza, D. R. H., Roque, M. M., Herrera, E. E., Murillo, J. P. M., Huallpa, J. J., ... & Gonzáles, J. L. A. (2023). Personalized tutoring: ChatGPT as a virtual tutor for personalized learning experiences. *Przestrzeń Społeczna (Social Space)*, 23(1), 293-312.
- Lyu, C., Xu, J., & Wang, L. (2023). New trends in machine translation using large language models: Case examples with ChatGPT. arXiv preprint arXiv:2305.01181.
- Mohamed, Y. A., Khanan, A., Bashir, M., Mohamed, A. H. H., Adiel, M. A., & Elsadig, M. A. (2024). The impact of artificial intelligence on language translation: A review. *IEEE Access*, 12, 25553-25579. <https://doi.org/10.1109/ACCESS.2024.3171245>
- Munday, J., Pinto, S. R., & Blakesley, J. (2022). *Introducing translation studies: Theories and applications*. Routledge.
- Muñoz-Basols, J., Neville, C., Lafford, B. A., & Godev, C. (2023). Potentialities of applied translation for language learning in the era of artificial intelligence. *Hispania*, 106(2), 171-194. <https://doi.org/10.1353/hpn.2023.0039>
- Opara, E., Mfon-Ette Theresa, A., & Aduke, T. C. (2023). ChatGPT for teaching, learning and research: Prospects and challenges. *Glob Acad J Humanit Soc Sci*, 5(1), 10-25. <https://doi.org/10.36352/gajhss.2023.05.010>
- Sahari, Y., Al-Kadi, A. M. T., & Ali, J. K. M. (2023). A cross sectional study of ChatGPT in translation: Magnitude of use, attitudes, and uncertainties. *Journal of Psycholinguistic Research*, 52(6), 2937-2954. <https://doi.org/10.1007/s10936-023-09844-5>
- Wu, T., He, S., Liu, J., Sun, S., Liu, K., Han, Q. L., & Tang, Y. (2023). A brief overview of ChatGPT: The history, status quo and potential future development. *IEEE/CAA Journal of Automatica Sinica*, 10(5), 1122-1136. <https://doi.org/10.1109/JAS.2023.3598327>
- Yeşilçınar, S. (2023). Personalized learning through gamification: A ChatGPT approach to English language learning. In G. Kartal Ed., *Transforming the Language Teaching Experience in the Age of AI* (pp. 44-64). IGI Global. <https://doi.org/10.4018/978-1-6684-9893-4.ch003>
- Yuan, Y., Li, H., & Sawaengdist, A. (2024). The impact of ChatGPT on learners in English academic writing: Opportunities and challenges in education. *Language Learning in Higher Education*, 14(1), 41-56. <https://doi.org/10.1515/llhe-2024-0005>
- Yuxiu, Y. (2024). Application of translation technology based on AI in translation teaching. *Systems and Soft Computing*, 6, 200072. <https://doi.org/10.1016/j.sasc.2024.200072>
- Zhao, W., Huang, S., & Yan, L. (2024). ChatGPT and the future of translators: Overview of the application of interactive AI in English translation teaching. In 2024 4th International Conference on Computer Communication and Artificial Intelligence (CCAI) IEEE. (303-307). <https://doi.org/10.1109/CCAI50596.2024.00101>