UKRAINIAN PHD STUDENTS' ATTITUDES TOWARD AI LANGUAGE PROCESSING TOOLS IN THE CONTEXT OF ENGLISH FOR ACADEMIC PURPOSES

Natalie Kramar,[1]
Senior Researcher, PhD in Philology,
Research and Educational Center of Foreign Languages,
National Academy of Sciences of Ukraine

kra_nat@ukr.net
ORCID: 0000-0001-5767-9200

Yaroslava Bedrych,[2]
Associate Professor, PhD in Philology,
Research and Educational Center of Foreign Languages,
National Academy of Sciences of Ukraine

bedrych@ukr.net
ORCID: 0000-0001-8634-3124

Zinaida Shelkovnikova,[3]
Associate Professor, PhD in Philology,
Research and Educational Center of Foreign Languages,
National Academy of Sciences of Ukraine

z.shelkovnikova@gmail.com
ORCID: 0000-0002-1112-627X

Abstract. *Mastering academic writing skills in English is essential for future researchers. At present, AI language processing tools provide high-quality, accessible, and fast assistance for translation, editing, and stylistic enhancement of scientific texts. However, their use within English for Academic Purposes (EAP) courses generates mixed reactions among educators and raises ethical concerns. Our study aimed to explore the predominant perceptions of AI language processing tools by PhD students of the National Academy of Sciences of Ukraine (NASU) from the viewpoint of their integration into the academic English course taught in the first year of their PhD studies. The study involved 52 PhD students from various NASU institutes. They completed a survey with both closed-ended and open-ended questions regarding their previous and expected use of online translators, writing enhancement tools, and ChatGPT for research writing purposes. The results of the survey show that NASU PhD students have extensive experience with online translators, but are less familiar with writing enhancement tools and less certain about their potential use in the future. Almost a third of*

---

[1] Corresponding author, responsible for conceptualization, methodology, data analysis, writing an original draft.
[2] Co-author, responsible for data collection, visualization, writing and editing.
[3] Co-author, responsible for data analysis, review and editing, resources.

the respondents expressed reservations about using ChatGPT for academic writing due to academic integrity concerns. Most of the respondents (66%) agree that the basics of ethical use of AI writing and editing tools should be incorporated into EAP courses. One subgroup of the participants (n = 11) took part in a small-scale additional intervention focused on writing enhancement tools. They were asked to apply Grammarly, QuillBot, and ChatGPT to edit their course projects (presentations of the current state of their dissertation research) and compare these tools according to various criteria. The feedback provided by this subgroup indicates that they were most satisfied with the quality of editing provided by ChatGPT but found Grammarly and QuillBot easier to use and more suitable for superficial grammar checks. We found out that the AI tools helped participants achieve improvements primarily in such aspects as the use of articles, punctuation, use of prepositions, and elimination of redundancy. The study has significant pedagogical implications, promoting the wider use of AI tools in the context of teaching English for Academic Purposes and addressing appropriate teaching techniques and methods.

Keywords: *AI language processing tools, English for Academic Purposes, writing enhancement tools, online translators, ChatGPT.*

СТАВЛЕННЯ УКРАЇНСЬКИХ АСПІРАНТІВ ДО ІНСТРУМЕНТІВ ОБРОБКИ МОВИ НА ОСНОВІ ШІ В КОНТЕКСТІ АНГЛІЙСЬКОЇ МОВИ ДЛЯ АКАДЕМІЧНИХ ЦІЛЕЙ

Оволодіння навичками академічного письма англійською мовою є ключовим для майбутніх науковців. На сьогодні, ШІ-технології обробки мови надають якісну, доступну та швидку допомогу для перекладу, редагування та стилістичного покращення наукових текстів. Однак їхнє використання в межах курсів англійської мови для академічних цілей викликає суперечливе ставлення з боку викладачів та породжує етичні труднощі. Наше дослідження мало на меті з'ясувати, як аспіранти Національної академії наук України (НАНУ) сприймають інструменти ШІ для обробки мови з точки зору їхньої інтеграції в курс англійської мови, що викладається на першому році навчання в аспірантурі. У дослідженні взяли участь 52 аспіранти з різних інститутів НАНУ. Вони пройшли опитування з закритими та відкритими запитаннями щодо їхнього попереднього та очікуваного використання онлайн-перекладачів, інструментів для редагування тексту та ChatGPT для академічного письма. Результати опитування показують, що аспіранти НАНУ мають великий досвід роботи з онлайн-перекладачами, але менш обізнані з інструментами для редагування та стилістичного покращення текстів і менш впевнені в їхньому потенційному використанні в майбутньому. Майже третина респондентів висловили побоювання щодо використання ChatGPT для написання академічних робіт з міркувань академічної доброчесності. Більшість респондентів (66%) погоджуються з тим, що основи етичного використання інструментів штучного інтелекту для написання та редагування текстів мають бути включені до програми курсу англійської мови для академічних цілей. Одна підгрупа учасників (n = 11) взяла участь в експерименті, направленому на отримання додаткової інформації про можливості застосування засобів редагування та стилістичного

покращення письма у навчанні академічній англійській мові. Їм було запропоновано застосувати Grammarly, QuillBot і ChatGPT у ході редагування своїх курсових проєктів (викладу поточного стану дисертаційного дослідження) та порівняти ці інструменти за різними критеріями. Відгуки, надані цією підгрупою, вказують на те, що вони були найбільш задоволені якістю редагування, яку забезпечує ChatGPT, але вважають Grammarly та QuillBot простішими у використанні та більш придатними для поверхової перевірки граматики. Було виявлено, що ШІ-інструменти допомогли учасникам досягти покращень передусім у таких аспектах, як вживання артиклів, пунктуація, використання прийменників, усунення надмірності. Дослідження має важливе педагогічне значення, сприяючи ширшому залученню інструментів ШІ у контексті викладання англійської мови для академічних цілей та висвітлюючи відповідні прийоми та методи навчання.

Ключові слова*: інструменти обробки мови на основі ШІ, англійська мова для академічних цілей, інструменти для покращення письма, онлайн-перекладачі, ChatGPT.*

1. INTRODUCTION

The rapid advancement of artificial intelligence (AI) has made a significant impact on various aspects of modern life, with education and science emerging as two of the most profoundly affected domains. In this evolving landscape, scientists, educators, and students now have access to a multitude of AI-powered tools designed for tasks ranging from translation and text generation to text editing. Among the remarkable innovations in this sphere, the groundbreaking ChatGPT stands out, used by millions of students on a daily basis.

Without a doubt, the major students' skill that is affected by the new technological advancements is writing. Apart from ChatGPT, a plethora of other AI tools can be used by students to enhance their writing in one or another way, including machine translation, grammar correction, and paraphrasing software, which is also based on artificial intelligence and thus can provide services of excellent quality, often on par with a human editor or translator. While academic writing is prioritized within many educational programs, in PhD courses its importance is presumably the highest, as aspiring scientists need to present their findings in journals and conference papers, often in English as a foreign language. However, PhD students often find it challenging, as our long-term experience of teaching EAP to this cohort bears witness. As frankly put by Australian researchers Michelle Cavaleri and Saib Dianati, "Most academic language and learning (ALL) advisers would agree that students' knowledge of grammar and punctuation is sketchy at best." (Cavaleri & Dianati, 2016, p. 223). The question thus arises: to what extent is it acceptable and beneficial for aspiring scientists to use AI tools to improve the quality of their writing? Academic integrity principles explicitly state the unacceptability of plagiarism in any form, but the official policy on using translation, editing, and writing enhancement tools is not so clear. From the pedagogic viewpoint, their use can definitely discourage students from honing their writing and translating skills, as they may become too reliant on technology. However, if we consider a broader perspective, the use of writing enhancement tools can significantly help talented

scientists overcome the linguistic injustice in the academic realm, i.e., the pressure to publish in English-language research journals, which creates an additional burden for non-English speakers (Hanauer et al., 2019).

The potential of applying automated writing evaluation (AWE) systems, often referred to as writing enhancement tools, in supplementing writing instruction has received ample attention from scholars. The use of commercial AWE systems has been reported to correlate with higher quality of students' writing in various academic settings and levels (Roscoe et al., 2017; Wilson, 2016; Wilson & Andrada, 2016). One important point made in these studies is that computer-generated feedback allows teachers to save time for teaching macro-level writing concepts while providing accurate corrections that students can rely on in revising their essays and other written assignments.

A vast array of studies has particularly focused on Grammarly, which is one of the most well-known online editors (Grammarly, n.d.). The basic version is free, but more advanced features (including paraphrasing and stylistic improvement) can be accessed via a paid subscription. It operates by underlining grammar errors in a text and suggesting corrections that a user can either accept or decline. Notably, Grammarly is now actively incorporating the generative AI technology, moving beyond error correction to also help users generate ideas and personalize the tone and voice of their writing (Grammarly, 2023). Empirical research suggests medium to significant improvements in students' writing due to the use of Grammarly and its overall positive perception by students of various levels and specializations (Burrot, 2022; Calma et al., 2022; Dong & Shi, 2021; Fitria, 2021; Ghufron & Rosyida, 2018; O'Neill & Russell, 2019; Yousofi, 2022). It has been noted that self-access nature of this tool and immediate grammar explanations it provides are particularly beneficial for students in building their writing confidence and grammar competence (Cavaleri & Dianati, 2016). Remarkably, one of the studies (O'Neill & Russell, 2019) compared a group of students who received Grammarly advice with a group of students given traditional teachers' feedback. The former turned out to be more satisfied with the quality of grammar correction. The authors thus claim that Grammarly can be used effectively to improve students' academic writing in universities and colleges. However, they note that the software should be applied in conjunction with instructors' feedback to be more effective and accurate. This is further evidenced by the finding that Grammarly helps students to reduce errors in vocabulary use, grammar, spelling and punctuation, while having very little impact on the content and organization of writing (Ghufron & Rosyida, 2018). It has also been reported that Grammarly can produce some excessive or inaccurate corrections, which require further filtering from users (Barrot, 2022; Koltovskaia, 2023; O'Neill & Russell, 2019).

One of Grammarly's close rivals in the market of grammar checkers is QuillBot. While it provides similar error correction functionalities, it additionally offers paraphrasing and plagiarism checking. The few empirical studies that have researched QuillBot's impact on students' writing report positive results, emphasizing the value of its paraphrasing feature in helping students to avoid plagiarism and hone their rewriting and summarizing skills (Fitria, 2021; Kurniati & Fithriani, 2022; Nurmayanti & Suryadi, 2023).

Another AI technology with deep implications for academic writing courses is machine translation (MT). The accuracy and coherence of MT output are improving by leaps and bounds, so that even professional translation has been largely reduced to postediting. The studies addressing the deployment of online translators, mostly Google Translate, in the writing classroom are unanimous that online translators can be a powerful pedagogical tool when used properly and with the teacher's supervision (Cancino & Panes, 2021; Kol et al.,

2018; Mundt & Groves, 2016; Tsai, 2019). Based on the experimental design, it has been shown that applying Google Translate correlates with fewer grammar mistakes, higher syntactic complexity, and more sophisticated vocabulary in students' writing (Cancino & Panes, 2021; Kol et al., 2018). However, it is emphasized that online translators are only beneficial for writing proficiency as long as students have the ability to critically assess their output and make appropriate adjustments. Despite the numerous apparent advantages of adopting MT technology in the EFL classroom, instructors often exhibit reluctance toward its integration (Gokgoz-Kurt, 2022). This reluctance underscores the need for additional research and discussion from the perspectives of various educational stakeholders, including teachers and students.

While machine translation and editing have been around for a long time, at the end of 2022, the world was overwhelmed with the power of large language models (LLMs) such as GPT-3. The revolutionary chatbot ChatGPT (Chat Generative Pre-trained Transformer), released in November 2022, immediately became hugely popular as it could effectively deal with a large number of tasks, such as writing essays and reports, summarizing information, solving mathematical problems, writing code, etc. After the initial lamenting of the harm this powerful tool presents for the academic environment, educators seem to be coming to terms with its inevitability and are finally seizing the opportunities provided by it. New frameworks and approaches are being developed to integrate ChatGPT into learning environments to the best advantage of both students and instructors (see, for example, Fiialka et al., 2023; Grassini, 2023; Leahy & Mishra, 2023; Lo, 2023; Sok & Heng, 2023).

In the realm of science, the immense potential of ChatGPT was grasped immediately. As reported in the journal *Nature*, scientists widely use this technology to summarize research papers, write code, structure their ideas, and obtain feedback on their research output (van Dis et al., 2023). Its ability to quickly process vast amounts of information can be effectively used by researchers to extract valuable information from voluminous studies, thus streamlining their routines (Dergaa et al., 2023; Ariyaratne et al., 2023). It has even been suggested that researchers should use ChatGPT to improve the quality of their review articles (Huang & Tan, 2023). Moreover, some authors consider it appropriate to cite ChatGPT as a co-author to acknowledge its help (Marchandot et al., 2023). Various journals are now revising their policies to clarify their stance on this issue.

Notably, even the researchers who are skeptical of its capacity to assist in generating high-quality scientific writing, admit that ChatGPT can be useful in checking for errors and refining language, especially for non-native writers (Zheng & Zhan, 2023). It has also been noted that while this tool cannot replace the thinking of a scientist, it can be used for brainstorming ideas, reformulating, and strengthening the coherence of one's writing (Lingard, 2023). Thus, while the debate rages on, the current consensus appears to be that ChatGPT can be used for streamlining some research writing tasks. Therefore, educators are also advised to teach science students the range of ChatGPT's capabilities and limitations (Dergaa et al., 2023). At the same time, it is emphasized that students should apply ChatGPT ethically and equitably, checking its output for factual inaccuracies and biased content (Ellerton, 2023). It is crucial to exercise discretion to avoid plagiarism, fabrication, and misattribution when using ChatGPT for science communication.

The use of online translators, editors, and ChatGPT among Ukrainian PhD students has remained uncharted territory so far. The purpose of our study is to fill this gap and inform pedagogical practices in EAP courses by uncovering the attitudes of NASU PhD students toward AI language processing tools. We posed the following research questions: 1) Do

NASU PhD students believe that AI language processing tools can be beneficial for their academic writing, based on their previous experiences? 2) Which tools are they most inclined to use in the future: online translators, writing enhancement tools, or ChatGPT? 3) What are the major concerns and reservations they have about the application of these technologies in the academic context? 4) Do they support the integration of the basics of ethical use of AI into the curriculum of English for Academic Purposes courses? We hypothesized that NASU PhD students would display positive attitudes toward AI language processing tools and would support their integration into the EAP courses' curriculum. We also expected that, given their advanced level of study, PhD students would be able to critically reflect on the strengths and weaknesses of the AI language technology, fully realizing the risks of excessive reliance on it.

2. METHODS

Research design

The study was conducted at the Research and Educational Center for Foreign Languages of the NAS of Ukraine, which provides training in foreign languages for academic purposes to PhD students of all institutes within the NAS of Ukraine. The study is based on a survey and combines quantitative data collection through closed-ended questions with qualitative evaluation of responses to open-ended questions and additional comments the participants provided in dedicated slots. The methodology is also complemented by a small-scale educational intervention to better understand the practical potential of integrating AI tools into the EAP classroom.

Participants

The sample comprises 52 PhD students from the National Academy of Sciences of Ukraine in various stages of their PhD course (1st, 2nd, or 3rd year of study). The participants come from diverse fields, with a prevalence of technical sciences.

Instruments and Procedure

Using Google Forms, we created a survey that combined both closed-ended (multiple choice and Likert scale) and open-ended questions about the respondents' previous experience with AI language processing tools and the likelihood of their future application. While closed-ended questions are easier to interpret and offer more reliable responses, open-ended questions can yield unanticipated answers and enable students to answer in their own words, leading to more profound insights (Walston et al., 2017). Their combination in our survey was intended to gather both quantitative and qualitative information to reveal the holistic picture of the PhD students' attitudes toward these tools. Moreover, each section of the survey contained a slot for comments where respondents were welcome to provide any further considerations related to this topic. The English translation of the survey questions is presented below.

Section 1. Online translators:

1.   Do you have experience using online translators for translating from or into English? a. Yes b. No
2.   If yes, which online translators have you used? (Select all that apply) a. Google Translate b. DeepL c. Others (please specify)

3.   Were you satisfied with the effectiveness of this tool / these tools? a. Yes b. Somewhat c. No (please specify the reason)
4.   On a scale of 1 to 5, how likely are you to use online translators for academic purposes in the future? (1 being very unlikely, 5 being very likely)

Section 2. Writing enhancement tools:

1.   Do you have experience using writing enhancement tools for working with English-language texts? a. Yes b. No
2.   If yes, which writing enhancement tools have you used? (Select all that apply) a. Grammarly b. QuillBot c. Wordtune d. Others (please specify)
3.   Were you satisfied with the effectiveness of this tool / these tools? a. Yes b. Somewhat c. No (please specify the reason)
4.   On a scale of 1 to 5, how likely are you to use writing enhancement tools for academic purposes in the future? (1 being very unlikely, 5 being very likely)

Section 3. ChatGPT:

1.   Do you have experience using ChatGPT to help with your English-language writing? a. Yes b. No
2.   If yes, for what purpose(s) have you used it? (Select all that apply) a. Generating ideas b. Editing c. Summarizing d. Translation e. Others (please specify)
3.   Were you satisfied with the effectiveness of this tool? a. Yes b. Somewhat c. No (please specify the reason)
4.   On a scale of 1 to 5, how likely are you to use ChatGPT for academic purposes in the future? (1 being very unlikely, 5 being very likely)

Section 4. Integration of AI language processing tools into the EAP curriculum:

1.   Do you agree that the basics of effective and ethical use of AI language processing tools should be included in the curriculum of English for Academic Purposes courses? a. Yes b. No c. Not sure
2.   Provide additional comments (optional).

The link to the survey was distributed via email to PhD students of 18 institutes of the NAS of Ukraine in June 2023. A total of 52 completed surveys were received. Occasionally, some of the questions were left unanswered, yielding a variation from 49 to 52 answers analyzed for each question. The survey was anonymous. The students were asked to indicate the field of their specialization to help us reveal potential discipline-specific variations, but this question was optional to ensure full protection of their anonymity.

To delve deeper into the relevance of writing enhancement tools for PhD students' creative output, we designed a small-scale intervention involving a group of 1st-year PhD students (n=11) from Chemistry and Materials Sciences. These students were asked to try out Grammarly, QuillBot, and ChatGPT to edit their course projects (3-page presentations of their research topics) after an introductory workshop on the functionalities of these tools, conducted by the lecturer. Given the broader functionalities of ChatGPT compared to the other two tools, the students were recommended to specifically use the prompts "edit" or "revise" before inputting their text into the chatbot. Afterwards, the group submitted two versions of their course projects: pre- and post-editing. This allowed us to identify the most

common areas of improvement achieved with the AI tools. The participants were then asked to fill out a short survey:

1. Rate your overall satisfaction with the quality of editing services of each tool (on a scale of 1 to 5);
2. Rate the ease of use of each tool (on a scale of 1 to 5);
3. Which of these tools are you most likely to use for academic writing enhancement in the future? Why?

Data Analysis

The percentage distribution of answers to closed-ended questions was calculated and visualized in charts. Additionally, responses to Likert-scale questions were analyzed with descriptive statistics methods (mean, median, mode, and standard deviation). Also, the Kruskal-Wallis H test was conducted using the SciPy package in Python to examine whether there were significant differences in likelihood ratings among the three categories: writing enhancement tools, ChatGPT, and online translators. Responses to open-ended questions and comments were categorized and subjected to content analysis to identify recurring themes.

The procedure for intervention analysis was twofold. First, the original and edited projects were closely reviewed to identify the most common types of mistakes that were rectified with the help of AI. Second, based on the survey, mean ratings and thematic findings across the three tools were identified to determine which tool was rated highest in various aspects and why.

Ethical Issues

Participation in the survey and the intervention was voluntary. Full anonymity was ensured through Google Forms. Students were informed that their decision to participate or not would have no consequences for their academic status or grading.

3. RESULTS

The survey responses elucidated both the previous and expected use of various AI language processing tools by the NAS PhD students. The crucial future-oriented question concerned the likelihood of the tools' application for academic writing further on (item 4 in sections 1-3). The likelihood ratings provided by the respondents for each category of the tools (online translators, writing enhancement tools, and ChatGPT) were analyzed with the Kruskal-Wallis H test. The test yielded a statistically significant result ($H = 10.50$, $p < 0.01$), indicating that there is a significant difference in likelihood ratings between the categories. A further look into the descriptive statistics values shows that respondents show a strong and consistent likelihood of using online translators in the future, as evidenced by the highest mean rating (4.23), the high median (5) and mode (5), and the relatively low variability in responses (standard deviation of 0.97). For writing enhancement tools, the likelihood of future use for academic purposes is moderate (mean of 3.86), though there is more variability compared to online translators (standard deviation of 1.34). The likelihood of future use for ChatGPT is likewise moderate (mean of 3.31) but shows the greatest variability (standard deviation of 1.47).

More in-depth analysis of the respondents' answers and comments is presented below, grouped by category.

Online translators

All of the respondents in our study reported having experience with online translation services from or into English. Not surprisingly, the majority (n = 39) stated that they have primarily used Google Translate for their translation needs. Only 13 participants mentioned using other services, including DeepL (n = 10), ContextReverso (n = 3), and Multitran (n = 1). As evident from the ample comments provided by the respondents, apart from scientific and technical texts, they have applied these tools for the translation of emails, news, legal documents, fiction, website content, and more.

Most of the respondents (n = 36) reported full or partial satisfaction with the quality of online translation services. Among the 16 participants who explicitly mentioned dissatisfaction, several reasons were specified. These included concerns about low accuracy, literal and superficial translations, improper handling of abbreviations, confusion related to scientific terminology, and the need for postediting by experts in the field.

Notably, 7 respondents regarded DeepL as providing higher-quality translations compared to Google Translate, especially for specialized texts. This finding suggests that PhD students may benefit from being introduced to a wide array of other translation tools beyond the widely-known Google Translate. Another recurring theme in the respondents' observations was the trade-off between speed and accuracy. They recognized that online translation services are valuable when handling a large volume of text quickly, but this expediency may come at the cost of accuracy.

The distribution of answers to the question "How likely are you to use online translators for academic purposes in the future?" is presented in Figure 1. Slightly more than half of the respondents (29) considered it very probable that they would use machine translation to work with academic texts in the future. Only three respondents rated his likelihood as relatively low, while none of them considered it to be totally unlikely. The results suggest that the PhD students view online translation tools as valuable for academic research and writing purposes due to the time expediency they provide, while mostly realizing their limitations in terms of accuracy for the rendition of scientific terms.
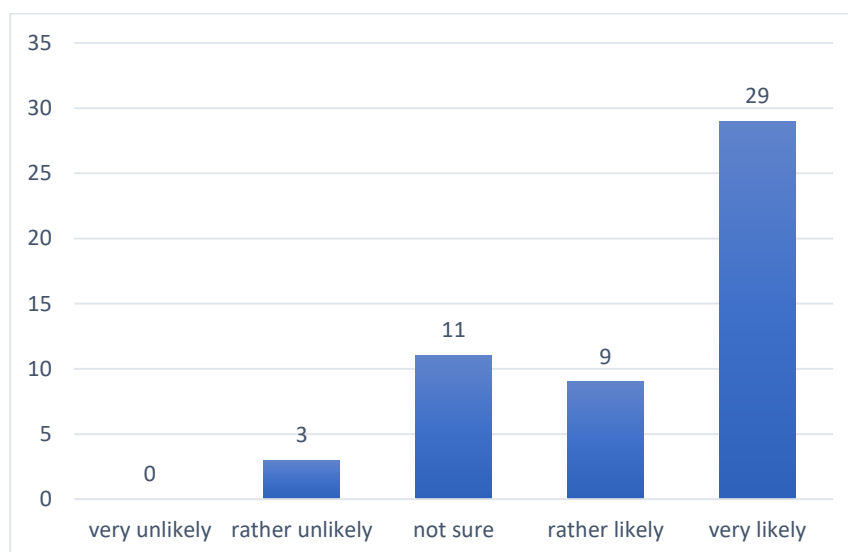

Figure 1. Distribution of answers to the question "How likely are you to use online translators for academic purposes in the future?"

ChatGPT

According to the survey data, most of the respondents (n = 33) have tried using ChatGPT for various purposes, including academic ones. Thus, they admitted applying the chatbot to facilitate research literature search, classification, and summarization, as well as formatting cited literature in the required style. Notably, most of these students expressed their dissatisfaction with the results ChatGPT produced for their research queries. They note that the tool often provides false results (the so-called "hallucinations") and makes inaccurate calculations. Commenting on summarization tasks, they point out the superficial nature of the returned summaries. Very few participants (n = 4) have used ChatGPT for writing enhancement (editing, rephrasing, and title selection) and/or translation. In this case, their comments show a higher level of satisfaction with the chatbot. This may be indicative of the need for EAP teachers to foreground the value of ChatGPT primarily for editing and rephrasing purposes, where it performs better and its use is completely ethical.

A group of respondents (n = 8), mostly representing the humanities (philosophy, law, etc.), articulate their extremely negative attitude toward the idea of using AI chatbots for academic research and writing due to the serious reputational risks it involves. Moreover, several students make the point that, when applied for writing assistance, such tools may use the author's original text for further learning and processing, which can potentially prevent the author from publishing it. This finding highlights the relevance of addressing the originality and authorship concerns of aspiring researchers in the EAP classroom. The prevalence of hostile attitudes toward ChatGPT among PhD students in the field of humanities as compared to technical and natural sciences may stem from the higher value of unique authorial voice and personal reflections in this area.

A total of 49 students provided their responses to the question, "How likely are you to use ChatGPT for academic purposes in the future?" As demonstrated in Figure 2, the answers are quite evenly distributed across the likelihood values. The absence of a clearly discernible trend in the students' responses reflects the multifarious and often diametrically opposite perceptions of ChatGPT among the NASU PhD students six months after its' public launch.
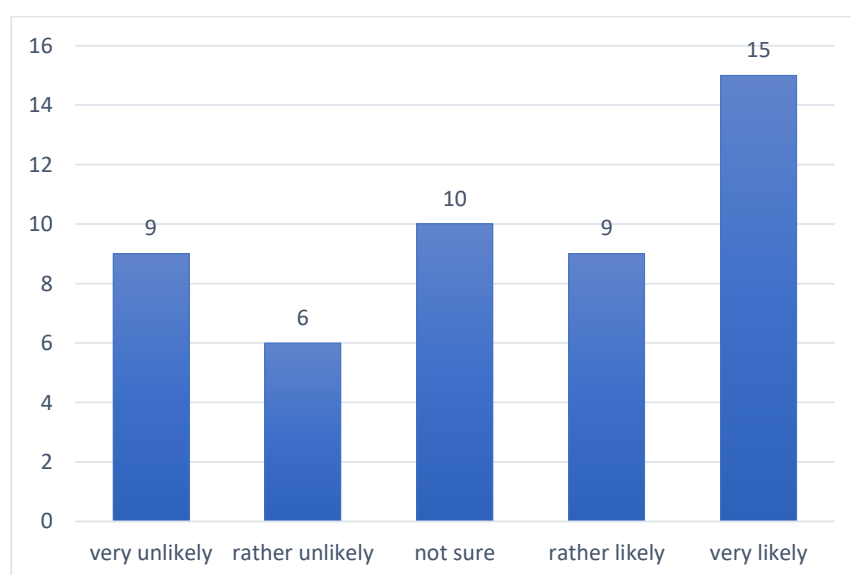

Figure 2. Distribution of answers to the question "How likely are you to use ChatGPT for academic purposes in the future?"

Writing enhancement tools

Based on the survey results, only 16 respondents (less than a third) reported having previously used online writing enhancement tools. The tool mentioned most frequently was Grammarly, which matched our expectations. Other tools, such as DeepLWrite, Wordtune, and LanguageTool, received only one mention each. Commenting on their experience in more detail, the respondents indicated that these tools are beneficial when working with scientific and technical texts. Thus, four respondents specifically reported using them to catch mistakes and slightly rephrase academic articles, conference papers, and presentations. Besides, three participants noted their value in correcting email communication with foreign colleagues. Generally, the respondents with some experience using online editors reported either full satisfaction (n = 11) or partial satisfaction (n = 5) with the quality of text correction and rephrasing. However, the recurring theme in their comments was the limitations of the free version as compared to the premium version of these tools, which offers more profound stylistic suggestions rather than simple grammar checks.

A total of 51 responses were provided for the question, "How likely are you to use online writing enhancement tools for academic purposes in the future?" (see Figure 3). Just as with online translators, most of the PhD students assessed the probability of their future use of writing enhancement tools for academic purposes as rather high or very high, despite a strong degree of variation in responses. It is quite remarkable that the number of these respondents significantly exceeds the number of respondents with previous experience of applying writing enhancement tools. This finding suggests that the students are aware of the rich functionalities and benefits of writing enhancement tools, but their English writing needs so far have been limited, especially as far as 1st year PhD students are concerned. Nevertheless, they are open to new technology and willing to try it further in their academic careers.
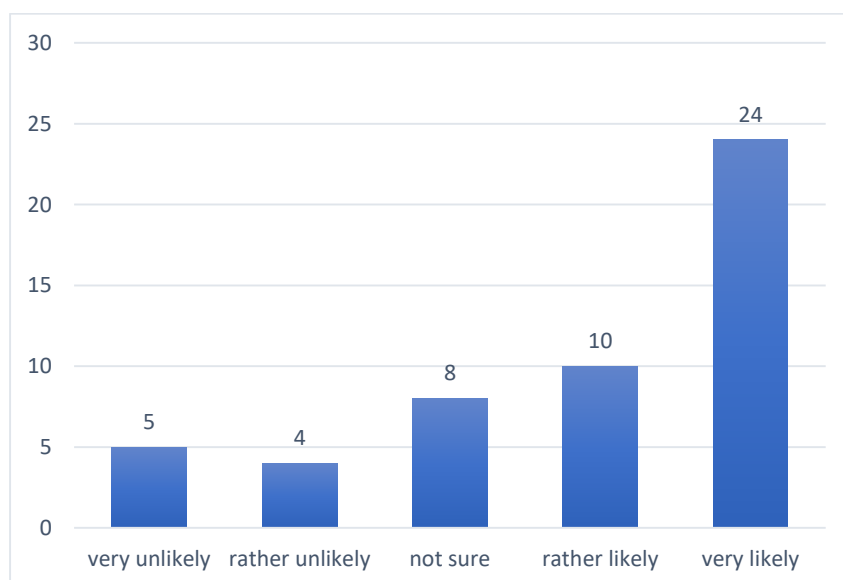

Figure 3. Distribution of answers to the question "How likely are you to use online writing enhancement tools for academic purposes in the future?"

Integration of AI language processing tools into EAP courses

The last section of the survey focused on the possibilities of integrating teaching AI language processing tools into pedagogical practice. The distribution of answers to the question "Do you agree that the basics of effective and ethical use of AI language processing tools should be included in the curriculum of English for Academic Purposes courses?" is depicted in Figure 4. The majority of respondents (66%) expressed agreement ("Yes"), 19% expressed uncertainty ("Not sure"), and only 14% indicated disagreement ("No"). Therefore, our hypothesis was confirmed, as we observed strong support for integrating AI tools into the curriculum of EAP courses among NASU PhD students.
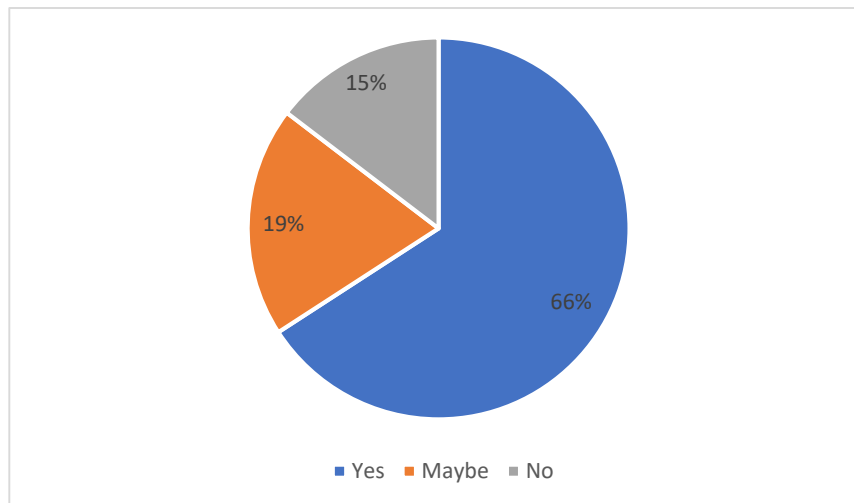

Figure 4. Distribution of answers to the question: "Do you agree that the basics of effective and ethical use of AI language processing tools should be included in the curriculum of English for Academic Purposes courses?"

Results of the educational intervention with writing enhancement tools and ChatGPT

The group of students who participated in the intervention submitted both the original versions of their course projects and the versions they revised with AI tools. On average, their scores were found to be higher compared to the non-intervention group (averaging 39 vs. 36 for the assignment with a maximum score of 40). Upon closely analyzing the original and edited versions of the submitted papers, we were able to point out the areas where the participants achieved significant improvements with the help of editing software (in the order of descending frequency):

1) Article use (18 cases)
2) Punctuation (16 cases)
3) Use of prepositions (12 cases)
4) Redundancy removal (10 cases)
5) Subject-verb agreement (7 cases)
6) Consistent use of tenses (6 cases)

In terms of grammar, major improvements were achieved in the areas of article and preposition use, both of which have proven challenging even for advanced-level EAP students. Nearly all participants corrected punctuation mistakes in their projects after consulting the tools, primarily inserting missing commas after introductory phrases. Apart

from that, the revised versions contained less redundancy (e.g*., the literature data on this topic – the literature on this topic; can be considered as an alternative – can be considered an alternative; in order to – to*). Occasionally, the corrections also extended to word choice, with more formal and academic words featured in the revised papers. Therefore, the tone, flow, and readability of the text were significantly enhanced.

Regarding the students' survey responses, overall satisfaction with the editing services was highest for ChatGPT (mean rating of 4.8), followed by QuillBot (4.4), and Grammarly (4.2). However, in terms of perceived ease of use, QuillBot took the lead with a mean rating of 4.9 (as compared to 4.3 for Grammarly and 3.9 for ChatGPT). Most of the participants (n = 7) indicated that they would most likely resort to ChatGPT for academic editing due to its more extensive rephrasing and word choice capabilities as compared to QuillBot and Grammarly. Furthermore, they liked the fact that ChatGPT provides broader explanations of the corrections, which can be further extended by prompting the chatbot with additional questions. At the same time, the students noted that when a cursory and speedy grammar check is needed, QuillBot and Grammarly can be preferable.

The participants' comments also revealed that they considered acquaintance with the writing enhancement tools quite valuable, occasionally even beyond the academic environment. Two of the participants admitted that the experiment urged them to start applying QuillBot and ChatGPT in their workplaces for written communication in English, thus boosting their confidence and removing the need for a human editor. A lot of comments provided by the students concerned QuillBot, as a less-known tool that they had not heard of before. Its simple interface and additional paraphrasing functions particularly appealed to them. One anecdotal drawback of these tools that was pointed out by the students is that they do not motivate one to learn English, but rather to the contrary. However, they admit that when a person is involved in oral communication with foreigners (either for work or scientific purposes), AI applications are no longer relevant, so the motivation remains strong.

4. DISCUSSION

The foremost finding of our study is that the surveyed PhD students mostly agree that they could benefit from the discussion of the AI language processing tools within the EAP course. Besides clarifying the upsides of using technology for academic writing, such a discussion would necessarily address the potential dangers, thus minimizing the educators' concerns about the unethical use of AI in academic writing, which are so common in the existing literature (Dergaa et al., 2023; Grassini, 2023; Sok & Heng, 2023). Moreover, this would also contribute to generating new ideas and making the educational process more relatable for the students (Fiialka et al., 2023).

Among the AI language processing tools, the respondents were most familiar with online translators. It appears that even advanced-level PhD students resort to them occasionally when quick results are required, while fully realizing the limitations of MT with regard to scientific terminology. Based on our findings, we agree with the scholars who claim that online translators can be valuable in relieving the cognitive load imposed upon students (Cancino & Panes, 2021; O'Brien et al., 2018). As the respondents' experience with MT is mostly limited to Google Translate, we believe they could benefit from teacher-led presentations and comparisons of various online translators to make more informed decisions in the future. Thus, in contrast to Google Translate, DeepL provides the function of pre-defining translations for particular words and phrases (the glossary feature), which might be particularly useful for scientific and technical translation. Another plus is the display of multiple translation variants for the user to choose from.

The same holds true for writing enhancement tools, among which the students are mainly familiar with Grammarly. However, our intervention has shown that PhD students can benefit from being introduced to other tools and comparing their performances in practice. This approach allows them to choose the most suitable one for different academic writing tasks. This underscores the value of experimenting with various writing enhancement tools under a teacher's supervision in the EAP classroom. Besides, comprehensive explanations provided by Grammarly and QuillBot offer the additional benefit of saving teachers' time, which was noted in previous studies (Koltovskaia, 2023; Roscoe et al., 2017; Wilson et al., 2017). Broader pedagogical implications of online editors' use by students include the development of self-directed learning with limited human interaction and honing proofreading skills necessary for their future careers (Barrot, 2022; Calma et al., 2022).

With regard to ChatGPT, the most controversial AI tool in the academic environment today, we have shown that NASU PhD students share many of the concerns that educators have about its risks for academic integrity. PhD students in the field of humanities were found to be particularly apprehensive about the potential applications of ChatGPT for scientific writing, primarily associating it with text generation. Such a critical attitude, however, may preclude aspiring scholars from leveraging its excellent editing and paraphrasing functionalities. Since PhD students often struggle with complex academic vocabulary, ChatGPT can assist them in seeking out more relevant and refined phrasing alternatives, particularly at the start of their academic careers. Additionally, as far as literature review writing is concerned, summarizing capabilities of ChatGPT are also worth discussing in the EAP classroom, as shown in numerous studies (Ariyaratne et al., 2023; Dergaa et al., 2023; Huang & Tan, 2023).

Some examples of educational practices that instantiate the integration of AI language processing tools into EAP teaching include: 1) introductory workshops to familiarize students with editing and grammar checking tools, covering their basic functionalities, benefits, and limitations; 2) creating and sharing resource lists that include links to AI tools, as well as tutorials, and guides; 3) encouraging students to check their writing assignments with Grammarly, QuillBot, or similar software before submission; 4) end-of-course discussions of students' experiences, along with the ethical challenges and concerns they may have faced. Paraphrasing functionalities of the AI tools under question can be investigated via group projects: for example, a passage with informal wording is assigned to three different groups, each required to use a different tool to make it sound more academic. The relevance and stylistic tone of suggested alternatives are afterwards discussed in the classroom, enabling students to ascertain that not all of the word or phrase replacements suggested by AI software may be fortuitous and fit for purpose. Thus, it is emphasized that individual consideration of the context and double-checking dictionaries for nuanced meanings is still an inalienable part of formal writing, whether it is AI-assisted or not.

The most significant limitation of our study is the relatively small sample size and the focus solely on NASU students. Administering similar surveys to a greater number of PhD students from various Ukrainian institutions would provide a more holistic picture of their use of and attitude to AI tools in academic writing. Another drawback of the research is its reliance on survey data, without involving semi-structured interviews, which could be valuable in providing more nuanced insights from the respondents.

5. CONCLUSIONS

The advent of powerful AI tools we are currently witnessing has the potential to revolutionize education, upending many traditional practices. As there is no turning the tide, educators are looking to integrate AI technology into academic courses. Advanced AI tools for translation, text generation and writing enhancement are particularly relevant for English for Academic Purposes, where much emphasis is placed on writing. The goal of our survey-based study was to find out the perceptions of AI language processing tools among Ukrainian PhD students.

The study extends the research on the deployment of language processing tools in EFL learning in important ways. First, it reveals the extent of awareness about these tools among Ukrainian students of the PhD level – the demography that has been overlooked in previous research. Second, it proves that even at the advanced level of study students can benefit from explicit teacher-provided instructions and guidelines on the use of AI tools because initially they may be skeptical of their potential to improve their writing. Third, it sheds light on the ethical and legal concerns that PhD students have about the use of AI technology for writing and editing their papers. The survey indicates that NAS PhD students consider it a valid idea to integrate the discussion of AI tools within EAP courses to address these concerns and further investigate the risks and benefits of applying AI language processing technology within the research process.

The positive response toward integrating AI language processing tools into EAP courses suggests a forward-thinking attitude among students and a recognition of the importance of these tools in modern academic and professional settings. Institutions should consider these findings when planning curriculum updates to ensure that they are meeting the evolving needs of their students.

Further research in this area could focus on the Ukrainian educators' views on writing enhancement tools within the EAP classroom. Another promising line of research would be comparing the use of AI language processing tools across various educational levels. Such efforts would most definitely fit within the newly evolving paradigm of the AI-assisted world.

REFERENCES

Ariyaratne, S., Iyengar, K. P., & Botchu, R. (2023). Will collaborative publishing with ChatGPT drive academic writing in the future? *British Journal of Surgery*, *110*(9), 1213-1214. https://doi.org/10.1093/bjs/znad295

Barrot, J. S. (2022). Integrating technology into ESL/EFL writing through Grammarly. *RELC Journal*, *53*(3), 764-768. https://doi.org/10.1177/0033688220966632

Calma, A., Cotronei-Baird, V., & Chia, A. (2022). Grammarly: An instructional intervention for writing enhancement in management education. *The International Journal of Management Education, 20*(3), 100704. https://doi.org/10.1016/j.ijme.2022.100704

Cancino, M., & Panes, J. (2021). The impact of Google Translate on L2 writing quality measures: Evidence from Chilean EFL high school learners. *System*, *98*, 102464. https://doi.org/10.1016/j.system.2021.102464

Cavaleri, M. R., & Dianati, S. (2016). You want me to check your grammar again? The usefulness of an online grammar checker as perceived by students. *Journal of Academic Language and Learning*, *10*(1), A223-A236. Retrieved 13 November, 2023 from https://journal.aall.org.au/index.php/jall/article/view/393

Kramar, N. et al. (2024). Ukrainian PhD students' attitudes toward AI language processing tools … . *Advanced Education*, 24, 41-57. DOI: 10.20535/2410-8286.305061

Dergaa I., Chamari K., Zmijewski P., & Ben Saad, H. (2023). From human writing to artificial intelligence generated text: examining the prospects and potential threats of ChatGPT in academic writing. *Biology of Sport*, *40*(2), 615-622. https://doi.org/10.5114/biolsport.2023.125623

Dong, Y., & Shi, L. (2021). Using Grammarly to support students' source-based writing practices. *Assessing Writing, 50*(7), 100564. https://doi.org/10.1016/j.asw.2021.100564

Ellerton, W. (2023). The Human and Machine: OpenAI, ChatGPT, QuillBot, Grammarly, Google, Google Docs, & humans. *Visible Language, 57*(1), 38-52. Retrieved 13 November, 2023 from https://www.muse.jhu.edu/article/893661

Fiialka, S., Kornieva, Z., & Honcharuk, T. (2023). ChatGPT in Ukrainian education: Problems and prospects. *International Journal of Emerging Technologies in Learning (iJET)*, *18*(17), 236-250. https://doi.org/10.3991/ijet.v18i17.42215

Fitria, T. N. (2021). QuillBot as an online tool: Students' alternative in paraphrasing and rewriting of English writing. *Englisia: Journal of Language, Education, and Humanities*, *9*(1), 183-196. https://doi.org/10.22373/ej.v9i1.10233

Ghufron, M. A., & Rosyida, F. (2018). The role of Grammarly in assessing English as a Foreign Language (EFL) writing. *Lingua Cultura, 12* (4), 395-403. https://doi.org/10.21512/lc.v12i4.4582

Gokgoz-Kurt, B. (2022). Using machine translation in EFL writing: A Scoping Review. In J.Qin & P.Stapleton, *Technology in Second Language Writing Advances in Composing, Translation, Writing Pedagogy and Data-Driven Learning* (pp. 45-62). Routledge. https://doi.org/10.4324/9781003279358-4

Grammarly (2023). GrammarlyGO brings personalized Generative AI to your writing process. https://www.grammarly.com/blog/grammarlygo-personalized-ai-writing/

Grammarly (n.d.). About Us. https://www.grammarly.com/about

Grassini, S. (2023). Shaping the future of education: Exploring the potential and consequences of AI and ChatGPT in educational settings. *Education Sciences*,13(7), 692. https://doi.org/10.3390/educsci13070692

Hanauer D.I., Sheridan C.L., & Englander K. (2019). Linguistic injustice in the writing of research articles in English as a Second Language: Data from Taiwanese and Mexican researchers. *Written Communication, 36*(1),136–154. https://doi.org/10.1177/0741088318804821

Huang J., & Tan M. (2023). The role of ChatGPT in scientific communication: writing better scientific review articles. *Am J Cancer Res.,13*(4):1148-1154. Retrieved 13 November, 2023 from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10164801/

Kol, S., Schcolnik, M., & Spector-Cohen, E. (2018). Google Translate in academic writing courses? *The EuroCALL Review*, *26*(2), 50-57. https://doi.org/10.4995/eurocall.2018.10140

Koltovskaia, S. (2023). Postsecondary L2 writing teachers' use and perceptions of Grammarly as a complement to their feedback. *ReCALL, 35*(3), 290-304. https://doi.org/10.1017/S0958344022000179

Kurniati, E. Y., & Fithriani, R. (2022). Post-graduate students' perceptions of QuillBot utilization in English academic writing class. *Journal of English Language Teaching and Linguistics*, *7*(3), 437-451. https://jeltl.org/index.php/jeltl/article/view/852

Leahy, S. & Mishra, P. (2023). TPACK and the Cambrian explosion of AI. In E. Langran, P. Christensen & J. Sanson (eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference* (pp. 2465-2469). New Orleans, LA, United States: Association for the Advancement of Computing in Education (AACE). Retrieved 12 November, 2023 from https://www.learntechlib.org/primary/p/222145/

Lingard, L. (2023). Writing with ChatGPT: An illustration of its capacity, limitations & implications for academic writers. *Perspectives on Medical Education*, *12*(1), 261-270. https://doi.org/10.5334/pme.1072

Lo, C.K. (2023). What is the impact of ChatGPT on education? A rapid review of the literature. *Education Sciences, 13*(4), 410. https://doi.org/10.3390/educsci13040410

Marchandot, B., Matsushita, K., Carmona, A., Trimaille, A., Morel, O. (2023). ChatGPT: the next frontier in academic writing for cardiologists or a pandora's box of ethical dilemmas. *European Heart Journal Open*, *3*(2), oead007. https://doi.org/10.1093/ehjopen/oead007

Mundt, K., & Groves, M. (2016). A double-edged sword: the merits and the policy implications of Google Translate in higher education. *European Journal of Higher Education*, *6*(4), 387-401. https://doi.org/10.1080/21568235.2016.1172248

Nurmayanti, N., & Suryadi, S. (2023). The effectiveness of using QuillBot in improving writing for students of English education study program. *Jurnal Teknologi Pendidikan: Jurnal Penelitian dan Pengembangan Pembelajaran*, *8*(1), 32-40. https://doi.org/10.33394/jtp.v8i1.6392

O'Brien, S., Simard, M., & Goulet, M.-J. (2018). Machine translation and self-post-editing for academic writing support: quality explorations. *Translation Quality Assessment*, *1*, 237–262. https://doi.org/10.1007/978-3-319-91241-7_11

O'Neill, R., & Russell, A. (2019). Stop! Grammar time: University students' perceptions of the automated feedback program Grammarly. *Australasian Journal of Educational Technology*, *35*(1). https://doi.org/10.14742/ajet.3795

QuillBot (n.d.). QuillBot. https://QuillBot.com/

Roscoe, R. D., Wilson, J., Johnson, A. C., & Mayra, C. R. (2017). Presentation, expectations, and experience: Sources of student perceptions of automated writing evaluation. *Computers in Human Behavior, 70*, 207-221. https://doi.org/10.1016/j.chb.2016.12.076

Sok, S. & Heng, K. (2023). ChatGPT for education and research: A review of benefits and risks. Social Science Research Network. http://dx.doi.org/10.2139/ssrn.4378735

Tsai, S. C. (2019). Using Google Translate in EFL drafts: a preliminary investigation. *Computer Assisted Language Learning*, *32*(5-6), 510-526. https://doi.org/10.1080/09588221.2018.1527361

van Dis E.A., Bollen J., Zuidema W., van Rooij R., & Bockting C.L. (2023). ChatGPT: five priorities for research. *Nature, 614*(7947), 224–226. https://doi.org/10.1038/d41586-023-00288-7

Walston, J., Redford, J., & Bhatt, M. P. (2017). Workshop on survey methods in education research: Facilitator's guide and resources (REL 2017–214). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Midwest. Retrieved 15 November, 2023 from https://ies.ed.gov/ncee/edlabs/projects/project.asp?projectID=4544

Wilson, J. (2016). Associated effects of automated essay evaluation software on growth in writing quality for students with and without disabilities. *Reading and Writing, 30*(4), 691-718. https://doi.org/10.1007/s11145-016-9695-z

Wilson, J., & Andrada, G. N. (2016). Using automated feedback to improve writing quality: opportunities and challenges. In Rosen, Y., Ferrara, S., Mosharraf, M. (eds.), *Handbook of Research on Technology Tools for Real-World Skill Development* (pp. 678-703). IGI Global: US. https://doi.org/10.4018/978-1-4666-9441-5.ch026

Yousofi, R. (2022). Grammarly deployment (in)efficacy within EFL academic writing classrooms: an attitudinal report from Afghanistan. *Cogent Education, 9*(1). https://doi.org/10.1080/2331186X.2022.2142446

Zheng, H., & Zhan, H. (2023). ChatGPT in scientific writing: a cautionary tale. *The American Journal of Medicine*, *136*(8), P725-726.E6. https://doi.org/10.1016/j.amjmed.2023.02.011

Conflict of interest
This publication does not have any conflict of interest.