

The Advantages and Limitations of AI-Powered Writing Assistants in the EFL Classroom: Recent Insights and Future Directions

Maryam Rezaee¹ and Alireza Allahyari^{1*}

Abstract--In this digital age, artificial intelligence (AI) technologies play a significant role in English as a foreign language (EFL) teaching and learning. One area that has received increasing attention is AI-powered writing assistants, in which AI-based tools are developed to assist EFL learners in improving their English writing output. This paper provides an overview of the advantages, and limitations of AI technologies applied to some popular writing assistants for English writing purposes. The overview indicates that there is still a critical gap between what AI educational technologies could do and how they are implemented in the EFL context. Therefore, interdisciplinary and transdisciplinary collaborative research is essential to overcome the limitations of current AI-powered writing assistants. This overview would serve as a good reference for guiding technology experts to develop more sophisticated intelligent writing assistants that adapt to EFL learners' diverse needs and preferences. The paper also provides rich discussions on future research directions from multiple perspectives.

Keywords--Artificial Intelligence, Writing Assistant, English Writing, English as a Foreign Language

I. INTRODUCTION

Writing is one of the most important skills for educational and professional success. Much research has shown that English as a Foreign Language (EFL) learners often do not have sufficient language proficiency to write in English as it requires lots of cognitive and language skills [1-4]. They should be able to develop ideas into a paragraph or essay [5] and express thoughts instead of showing competence in the use of spelling, punctuation, and grammar rules [6]. Furthermore, some EFL learners should be able to write in English for academic and professional purposes that require advanced writing skills. However, many learners, even at an advanced level, still find English writing a challenging task [7-8].

With the recent advancement of AI technologies, AI-powered writing tools have been developed to help EFL learners improve their writing skills [9-10]. These digital tools are popular among EFL learners and are widely used inside and outside the language class. Recent research suggests that writing tools can have a positive effect on English writing

quality [11-19]. Despite the positive impact of these tools on EFL writing outcomes, the area of AI-based writing assistants in foreign language learning is rather new, therefore, to date, a general lack of research studies on AI applications in foreign language learning can be witnessed [4]. To the author's knowledge, relatively few studies have focused on the advantages and limitations of digital writing assistants for EFL writing. Therefore, more information is needed to understand the potential benefits and constraints of these writing tools for EFL learners.

To further develop AI technologies for EFL writing, this paper attempts to provide an overview of the features, advantages, and limitations of ten popular AI-powered writing tools among EFL learners. The overview serves as a reference for guiding varied stakeholders, including educators, educational researchers, and AI technology experts to assist EFL learners in English writing in multiple ways. For instance, AI technology experts may note the advantages and limitations of these tools for learners' diverse needs and get inspired to develop more advanced writing assistants through further research, development, and evaluations. Likewise, educators may identify and select appropriate AI technologies for varied educational goals. In the following sections, the paper addresses AIs in education and then discusses the features, advantages, and limitations of digital writing tools used in the EFL context. Finally, it presents future research directions and the conclusion.

II. THE OVERVIEW

This paper aims to provide an overview of ten popular AI-powered writing assistants in the EFL context to build a deeper understanding of AI technologies applied to digital writing tools, including their features, advantages, limitations, and future directions. Specifically, this overview intends to generate practical guidelines and to be a source of inspiration for both educators and AI technology experts.

A. AI-Powered Tools in Education

The integration of computer technology in language education began in the 1960s, leading to the development of

1. Iranian Research Organization for Science and Technology, Tehran, Iran.
Corresponding author Email: allahyari@irost.org

Computer Assisted Language Learning (CALL). By the 1970s, the emergence of Artificial Intelligence in Education (AIED) began shaping how technology was applied to teaching and learning, paving the way for Intelligent CALL (ICALL). AIED aims to create AI-powered systems, including virtual pedagogical agents, AI robots, and intelligent educational systems, which enhance learning experiences through flexibility, engagement, and personalization. Additionally, these technologies help automate routine teaching tasks, thus allowing educators to focus more on instructional quality.

The development of so-called narrow AIs with less complex algorithms that are good at doing one thing in particular, for instance, AI-powered writing assistants, explicitly shows that data-driven, multi-layered technologies based on algorithms have transformed from a niche discipline into a highly relevant technology for education, including language learning purposes [9]. AI-powered tools affect the educational system much more substantially than merely on the level of didactic surface structures [9]. This is because they blur the boundaries between formally organized learning environments in schools and informal learning opportunities in leisure time and at home [10]. On the one hand, the potential of these tools to analyze unprecedented amounts of data collected in real time, combined with novel methods from the field of AI, is bringing the optimization of teaching and learning processes into a particular focus [22].

Big Data, combined with sophisticated analytical processes, gives hope for a new era of personalized learning, formative assessment, and student-centered, collaborative forms of learning [23]. But, on the other hand, they challenge learners to adopt an entirely new approach to these new digitally enhanced educational spaces. However, due to the complexity of such systems, the development of AI-based foreign language learning tools that adapt to learner heterogeneity, thus enabling high-level subject learning, is still in its infancy [9]. Before discussing the potentials and limitations of AI-powered writing tools for EFL writing, it seems relevant to note that this paper focuses on learner-facing AI tools. These types of AIs are supportive tools that help learners improve in a particular subject matter through specific practice patterns, reflective feedback mechanisms, or behavioral drills [23].

B. AI-Powered Writing Assistants

As noted in [24], the increased attention of educators and teachers to support learners' writing skills along with technological development has led to the creation of a new generation of AI-powered writing assistants. Dale and Viethen [25] highlight that AI writing systems utilize extensive linguistic models to provide a comprehensive range of language assistance services. These services encompass various functions, including machine translation, sentence and text generation, among others, allowing users to benefit from advanced language processing capabilities. Such systems leverage vast amounts of textual data to improve accuracy and fluency in generating human-like writing, thereby enhancing communication and productivity for users in diverse contexts.

These writing tools help learners go through various steps of the writing process individually by providing suggestions for corrections and improvements. In the EFL context, learners at different levels of English proficiency can use digital writing

tools to correct various grammatical, lexical, spelling, punctuation, and contextual errors based on the corrective feedback they receive from the writing tools.

C. The Advantages and Limitations of AI-Powered Writing Assistants in EFL Writing

There are plenty of AI-powered writing assistants available on the Internet which provide various services to EFL writers. This section aims to examine the advantages and limitations of ten popular digital writing tools in EFL writing, namely, *Grammarly*, *ProWritingAid*, *Ginger*, *GrammarCheck*, *Essaybot*, *Wordtune*, *Linguix*, *Quill Bot*, *Trinka*, and *LanguageTool*.

Grammarly

Grammarly (www.grammarly.com) offers linguistic recommendations and adaptations for a text based on knowledge and predictions about the target reader, the level of formality, the domain, the tone, and the intent [9]. This tool might help the learner develop a specific awareness of a language's versatility. The free version offers a relatively basic approach to a language checker, whereas the premium version is rather costly. Since the learner has to write a text before it is analyzed initially, the productive writing skill is not being 'threatened' or replaced by the machine. Grammarly indicates whether an expression or passage within the written text is incorrect and offers linguistic feedback [9].

Not only do the learners get an overall score for their initial productive performance, but Grammarly also offers them coursebook-like explanations concerning various lexical and grammatical phenomena. It can also integrate with other applications, such as Twitter, LinkedIn, Facebook, and Gmail, enabling the learners to receive proofreading services while typing texts in these applications. Despite the advantages of Grammarly for EFL writing, it cannot guarantee 100% linguistic accuracy, since pragmatically coherent texts are strongly context-dependent. The context consists of many cultural implications so one system alone cannot guarantee complete appropriateness. Furthermore, systems like Grammarly frequently show redundant feedback recurrence patterns, which means that they often use the same feedback suggestions for different types of mistakes [9].

ProWritingAid

ProWritingAid (www.prowritingaid.com) offers more advanced feedback reports than other writing assistants by analyzing the text in 20 different ways to appeal to different users with different strengths and weaknesses in writing. Besides, the tool gives scores to each report as well as the overall score, making it easier for the writer to improve the text. ProWritingAid serves as a grammar checker, a style editor, and a writing mentor. This tool creates an entertaining and interactive learning environment for EFL writers by combining suggestions, texts, audiovisuals, and quizzes [26]. Moreover, ProWritingAid integrates with other applications such as Ms. Word, Open Office, Google Docs, Scrivener, and Google Chrome for ease of editing. The users can also choose what type of feedback reports they intend to receive. Despite the aforementioned strengths, this application has some limitations.

Firstly, user registration is necessary before using free and premium services. Last, the comprehensive reports provided by this tool might make the feedback complicated and therefore difficult to understand.

Ginger

Ginger (www.gingersoftware.com) uses patent-pending technology which provides users with quick corrective feedback on their writing. It corrects grammatical errors and contextual misspellings. Ginger suggests the best synonyms that fit the meaning of the original sentence and offers alternative structures. Similar to Grammarly and ProWritingAid, this tool can integrate with other applications, allowing learners to receive proofreading services while typing their texts in these applications. More interestingly, Ginger has a text-to-speech feature, a personal English trainer, a dictionary, and a translation tool that provides users with individualized practice sessions based on their errors. It offers basic and regular services. The key features are only offered when using a regular service. Therefore, users should pay a subscription to utilize all the key features of this application.

Grammar Check

GrammarCheck (www.grammarcheck.net) checks English texts for grammatical, spelling, and punctuation errors. Compared to the above three writing assistants, it is the simplest and the easiest tool to use since it does not need any software installation and user registration. GrammarCheck offers two types of services for grammar checking, namely Free Check and Deep Check. By using Free Check, the tool immediately shows spelling errors, and grammar or style suggestions. However, sometimes it does not detect out some small punctuation errors. Unlike Free Check, the Deep Check version can spot mistakes that are difficult to find. GrammarCheck is a right choice for users who need a quick and simple correction for their writing and they do not look for more advanced feedback. It is also a good choice for low English proficiency learners [27].

Essaybot

Essaybot (www.essaybot.com) is a website that uses AI to help EFL learners write their essays. The learners simply type the topic of their essays and the AI generates a list of potential resources that they can use to research their topic. Once they select a resource, Essaybot will then provide learners with a list of different points that they can include in their essays. One of the main advantages of using Essaybot is that it can help EFL writers save a lot of time. Traditional essaywriting services can often be quite time-consuming as learners need to search for resources, create an outline and then write the essay itself. With an AI service like Essaybot, all of this can be done in a matter of minutes.

Another advantage of using the Essaybot is that it can help EFL learners to improve their writing skills by giving them an idea on how to structure their essays and what sort of information to include. This can be extremely helpful if they are struggling with their essay writing skills or if they want to make sure that their essays are as good as they can be. Further, Essaybot allows EFL writers to choose the length of their essays. Of course, there

are also some disadvantages to using the Essaybot. One of the main disadvantages is that EFL learners will not be able to speak to a real person when they use the service. This means that if learners have any questions about their essays, they will not be able to get them answered by a real person. Additionally, as the service is completely automated, there is always the potential for errors.

Wordtune

Wordtune is an intelligent writing assistant that translates the writer's ideas into English and offers paraphrase options using different tones and lengths. This tool assists EFL writers in learning how to develop their ideas in written English. Wordtune learns patterns from a large dataset to suggest options for rewording the sentences without referring and using the contents of other online sources. Users can see basic options for rewording a maximum of 20 sentences per day in the free version. However, the users of the premium version are offered various rewrite options on without any limitation on the number of sentences. Rewrites are very important for improving the writing quality since they offer the writers with opportunities to notice incoherence in their writing and therefore, they can learn to communicate meaning through rewriting [28]. The revisions enable EFL learners to develop their interlanguage system and English writing proficiency and become autonomous writers [29].

EFL writers at varying levels of English proficiency can use Wordtune. For instance, the translation feature enables novice EFL learners to generate paraphrase options in English based on their original sentence. Also, Wordtune can help intermediate and advanced EFL writers to improve their English quality by offering synonyms, deleting incorrect words, and using an appropriate writing tone [30]. This tool also enables EFL writers to make their sentences shorter or longer by using the shortening and lengthening function. Similar to other writing assistants, this tool has also some limitations. One major limitation is that Wordtune does not provide users with offline services. Furthermore, the rewrite options might be incorrect if the original text is too complicated.

Linguix

Linguix is a great alternative to Grammarly in terms of accuracy and usability. This tool uses AI to check grammar, spelling, and punctuation, and it is very effective at understanding the context of the writing. The Sentence Rewriter feature provides alternatives to enhance the clarity of writing without losing personal style. Another useful feature is the Content Quality Score, which rates writing based on readability, correctness, and style.

Quill Bot

Quill Bot is an AI-powered online application that can paraphrase text. After entering or pasting the text and clicking the "Paraphrase" button, Quill Bot can rephrase the content [31]. In addition to paraphrasing, Quill Bot offers various tools such as a summarizer, plagiarism checker, grammar checker, co-writer, translator, word counter, and citation generator to ensure accuracy [32]. Quill Bot can be used as a writing assistant to enhance writing quality by correcting grammar and summarizing lengthy sentences.

Trinka

Trinka is a web-based platform that utilizes AI to assist writers in creating academic papers and other types of technical writing [33]. It provides various tools such as Proofreading Tools, Grammar Checker, Essay and Thesis Checker, citation checker, plagiarism checker, and journal finder [34]. Trinka AI has high accuracy, using advanced algorithms to detect contextual spelling mistakes, advanced grammar errors, and tone inconsistencies. It also offers detailed explanations and tips to help users enhance their writing. The premium plans include additional features such as advanced grammar checks, plagiarism checks, and journal finder.

LanguageTool

LanguageTool is an AI-powered grammar checker and paraphraser that can detect many errors that a simple spell checker cannot, such as grammar issues, commonly confused words, and punctuation oversights. It also provides style suggestions to improve writing, including synonym replacements for overused words, concise rephrasing of wordy sentences, and formal alternatives to commonly used expressions. Its grammar and spelling correction works across several commonly spoken languages, and it can distinguish between American and British English. Additionally, LanguageTool features a personal dictionary where users can add exceptions or words that are not found in a conventional dictionary. The tool will learn to recognize these words for future grammar checking and proofreading. Unlike other services such as Grammarly, QuillBot, and Ginger, LanguageTool supports more than 25 languages.

III. DISCUSSION

AI-powered writing tools can help EFL learners improve their English writing quality. To realize the full potential of AI for EFL writing, it is important to apply AI technological innovations to writing tools used for EFL writing purposes. Fig. 1 summarizes the ten widely used AI-powered writing assistants discussed above and showcases how learners and educators may benefit from using them.

For learners, these tools provide personalized, just-in-time corrective feedback, and help them produce better quality writing output which in turn may improve learners' writing skills [2]. Likewise, educators may refer to the above figure and select appropriate AI writing assistants for different EFL writing purposes, without considering all the technical details. For instance, GrammarCheck is a right choice for novice English language learners or users who just look for a simple correction and don't need any advanced feedback. However, for in-depth feedback, ProWritingAiding can be a right choice. Linguix, Quill Bot, Trinka and LanguageTool are not just for novice users; they also provide sophisticated features that support proficient writers in refining their writing style, enhancing clarity, and maintaining academic and professional standards. As highlighted in Fig. 2, writing assistants still have some limitations such as costly premium (paid) services, complicated or redundant feedback mechanisms, unavailability of offline services, the potentiality for errors, the lack of interactive problem-solving support, and failure to recognize contextual errors or culturally sensitive implications.

In addition to the above-mentioned limitations, AI-powered writing assistants pose some challenges to learners and educators. One major challenge is the ethical and privacy issues of AI in education which can gather detailed information about the actions and preferences of learners and teachers. Another key challenge is that AI expertise is limited among language educators due to the absence of practical guidelines. Moreover, the integration of AI writing tools in educational settings can evoke various concerns among learners, particularly anxiety. This anxiety may stem from several factors including learners' concerns about over-reliance on AI tools and the potential impact of these tools on their writing proficiency and creativity.

Therefore, as the use of writing assistants becomes more common in EFL learning, both learners and educators must develop realistic expectations regarding the potential of these tools. Providing a comprehensive overview of the advantages and limitations of various writing assistants can enhance educators' understanding of the current capabilities of AI-powered tools in EFL writing. This knowledge can serve as a guide for selecting suitable tools for English language classrooms, ensuring that educators can make informed decisions that enhance the learning experience and support student writing development.

Additionally, recognizing the technical limitations of writing assistants is essential. Leveraging the insights from the ongoing research into the constraints of AI writing tools can inform future advancements in AI, ensuring that developments are practical, ethical, and inclusive. This approach will facilitate more effective integration of AI writing assistants in EFL instruction, ultimately improving learning outcomes and enriching the educational experience for both students and teachers.

This technology overview may also develop more effective communications among AI technology experts, educational researchers, language educators and teachers and thus bring about productive collaborations in AI research on intelligent writing assistants. The absence of educational perspectives in AI research has been stressed in recent reviews on AI [35-39]. Therefore, to develop AI technologies for EFL writing, maybe as the first significant step, language educators and educational researchers should be involved in the technological innovation process, and provide theoretical and pedagogical support from educational research. To achieve this, educators should actively enhance their awareness of the potential benefits and applications of AI technologies within their classrooms or institutions. By familiarizing themselves with the capabilities of AI tools, educators can better integrate these resources into their teaching practices, optimize student engagement, and improve learning outcomes. This awareness will also empower educators to make informed decisions about how to effectively utilize AI applications to support language learning and enhance instructional strategies.

AI assists EFL writers in becoming self-directed through self-assessment [40]. In fact, the self-assessment feature of AI language leads to sustainable assessment which requires new skills on the part of learners. This feature plays an important role in moving away from teacher-centered to student-centered learning. The dominant role of teachers as the evaluators of the learners' performance in traditional learning environments often causes learners' dissatisfaction, anxiety, and boredom.

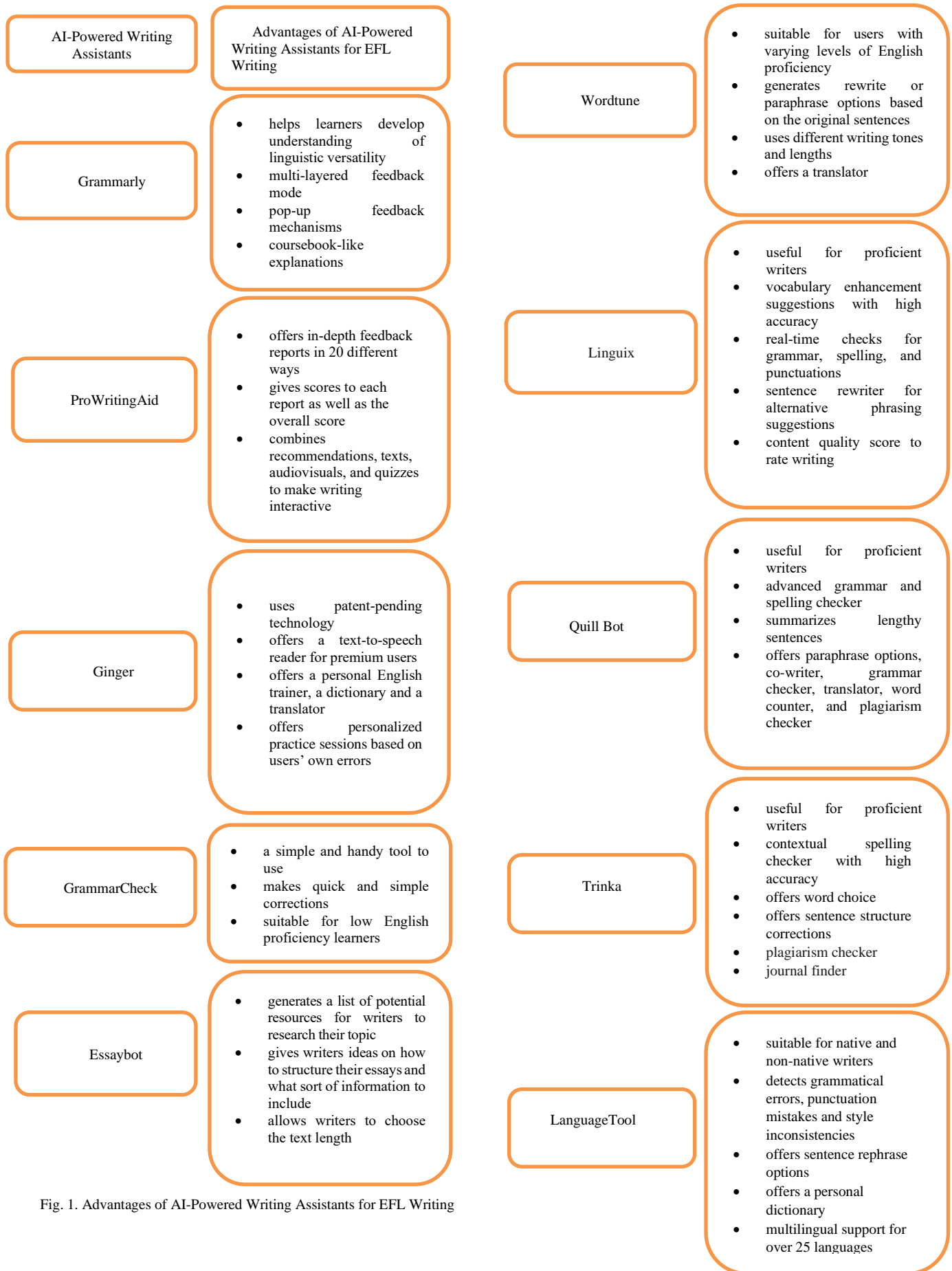


Fig. 1. Advantages of AI-Powered Writing Assistants for EFL Writing

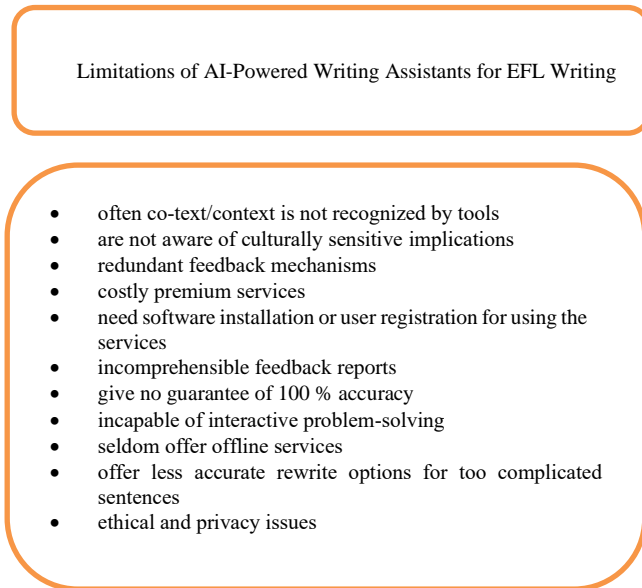


Fig. 2. Limitations of AI-Powered Writing Assistants for EFL Writing

Conversely, AI technology can increase students' motivation for learning and allow teachers to reduce their workload through student self-assessment [41].

IV. DIRECTIONS FOR FUTURE RESEARCH

AI research on writing assistants has yet to be continued to provide practical guidelines for language educators and teachers. Although AI technologies have advanced for educational purposes, recent literature reviews have emphasized the necessity for educational perspectives in AI research [35-37]. To reach the full potential of AI-powered tools in foreign language learning, collaborative research involving language educators and educational researchers in real educational settings seems necessary. Future studies could examine the advantages and limitations of other commercially available tools for writing assistance as well as evaluate their integration into foreign language learning programs. Further studies could be conducted to compare the effects of recently developed writing assistants on the overall quality of EFL writing, analyzing metrics such as grammar, lexicon, coherence, spelling and structure before and after using these tools and evaluating their integration into foreign language learning programs. Research could focus on the usability of various writing tools, evaluating factors such as ease of use, accessibility for diverse learners, and user satisfaction. Understanding how learners interact with these tools can inform future designs.

Additionally, researchers could examine the long-term effect of using digital writing tools on EFL learners' writing performance, and assess their contributions to the improvement of writing skills after a period of time. For this purpose, it is essential to design and implement pre- and post-language tests with EFL learners to obtain objective

feedback on writing skill development across various linguistic areas, such as lexicon, grammar, and spelling. By conducting error analysis on written productions both before and after the use of AI writing assistants, educators can gain valuable insights into the impact of these tools on students' writing.

This approach will allow for a systematic assessment of improvements or changes in writing abilities, guiding educators in identifying specific strengths and weaknesses in learners' outputs. Furthermore, it can help assess the effectiveness of different writing assistants in addressing individual linguistic challenges, ultimately contributing to more targeted instruction and personalized learning experiences. By coupling quantitative data from the tests with qualitative feedback from learners regarding their experiences with the tools, educators can gain a comprehensive understanding of the practical applications and limitations of AI writing assistants in EFL contexts and also identify specific areas for improvement. This information can be invaluable for technology developers, who can use learners' feedback to refine features, enhance user experience, and address any limitations identified in the research. Sharing the findings with the wider educational community through workshops, presentations, and publications, educators can help inform best practices and strategies for integrating AI writing assistants more effectively in EFL classrooms.

Future studies should also comprehensively examine the roles teachers play in integrating writing assistants into the classroom. Research should focus on pedagogical design to investigate how pedagogical tasks should be crafted to effectively incorporate writing assistants. This includes understanding the balance between technology use and traditional teaching methods. The guidance strategies should be also explored to understand how teachers can best guide students in using these tools, ensuring that they enhance rather than hinder learning. Additionally, future studies should explore teachers' factors such as their digital literacy, training needs, and their preparedness and perception of these tools as well as learners' perspectives of using writing tools including their experiences and anxiety about the use of AI tools in the learning environment.

By focusing on these areas, future research can contribute to a better understanding of the dynamics between technology, pedagogy, and learner outcomes, ultimately leading to more effective integration of writing assistants in educational practices.

V. CONCLUSION

AI-powered writing assistants are digital tools that use AI and assist EFL learners in the writing process. These digital tools can provide writers with learning opportunities and individualized writing experiences, and develop strategies for desirable writing outcomes. They create a supportive learning environment where EFL learners can have more personalized writing experiences. The AI-powered writing

assistants provide corrective feedback on spelling and grammatical errors, and suggest synonyms, and substitutions for overused words. The above overview may help educators gain a deeper awareness of some popular AI-powered tools and enable them to facilitate the use of these tools effectively and appropriately in the EFL classroom.

Despite the advantages of AI-based writing assistants, the overview suggests that these digital tools are not capable of interactive problem-solving, intelligent error analysis, adaptive feedback, and scaffolding. This finding is in line with an analysis of 50 current foreign language learning programs by researchers [42] who demonstrated that many currently available programs do not offer these elements. Therefore, existing writing tools are mostly of very poor quality in terms of feedback. Further, privacy and AI ethics are critical issues yet to be carefully addressed for foreign language learning.

AI innovations in education are new, and there is little collaboration between AI technology experts, language educators, and educational researchers in AI research and related fields such as AI-based adaptive systems [39]. Therefore, the full potential of AI educational technologies has not been realized in authentic educational settings [43]. The integration of AI into educational technologies requires collaborative longitudinal research. What is evident is that further research on AI writing assistants would result in useful guidelines for language educators and development of new digital writing tools for teaching and learning.

REFERENCES

- [1] Faller, J. M. V., "Grammarly investigation into EFL writing issues involving Omani learners", *International Journal of Language and Linguistics*, 5(3), (2018). <https://doi.org/10.30845/ijll.v5n316>
- [2] Nobles S, Paganucci L., "Do digital writing tools deliver? Student perceptions of writing quality using digital tools and online writing environments", *Computers and Composition* 38 (1), 16–31, (2015).
- [3] Singh, J. P.: *United Nations Educational, Scientific, and Cultural Organization (UNESCO): creating norms for a complex world*. Routledge (2010).
- [4] Alharbi, W., "AI in the foreign language classroom: A pedagogical overview of automated writing assistance tools", *Education Research International*, (1), (2023).
- [5] Yamin M., "Learning from students' experiences in writing paragraph", *Metathesis: Journal of English Language, Literature, and Teaching*, 3(2), 188-202, (2019).
- [6] Fairbairn, G., & Winch, C., *Reading, Writing, and Reasoning: a guide for students*, McGraw-Hill Education (UK), (2011).
- [7] Hasanah, Y.A., "Using picture sequences to improve student's ability in writing narrative texts", *Doctoral Dissertation*, Universitas Negeri Malang, (2008).
- [8] Masduqi, H. "Critical thinking skills and meaning in English language teaching", *Teflin Journal*, 22(2), 185-200, (2011).
- [9] Schmidt, T., & Strasser, T., "Artificial intelligence in foreign language learning and teaching: A CALL for intelligent practice", (2022).
- [10] Seufert, S., Guggemos, J., & Tarantini, E., "Digitale Transformation in Schulen. Kompetenzanforderungen an Lehrpersonen", *Beiträge zur Lehrerinnen- und Lehrerbildung: Zeitschrift zu Theorie und Praxis der Aus- und Weiterbildung von Lehrerinnen und Lehrern*, 36 (2), 175-193, (2018).
- [11] Marzuki, Widiati, U., Rusdin, D., Darwin, & Indrawati, J., "The impact of AI writing tools on the content and organization of students' writing: EFL teachers' perspective", *Cogent Education*, 10(2), (2023).
- [12] Kurniati, E. Y., & Fithriani, R., "Post-graduate students' perceptions of Quillbot utilization in English academic writing class". *Journal of English Language Teaching and Linguistics*, 7(3), 437–451, (2022).
- [13] Wang, Z., "Computer-assisted EFL writing and evaluations based on artificial intelligence: A case from a college reading and writing course", *Library Hi Tech*, 40(1), 80–97, (2022).
- [14] Zhao, X., "Leveraging artificial intelligence (AI) technology for English writing: Introducing wordtune as a digital writing assistant for EFL writers", *RELC Journal*, (2022).
- [15] Tambunan, A. R. S., Andayani, W., Sari, W. S., & Lubis, F. K., "Investigating EFL students' linguistic problems using grammarly as automated writing evaluation feedback", *Indonesian Journal of Applied Linguistics*, 12(1), 16–27, (2022).
- [16] Lam, R., & Moorhouse, B. L., "Using digital portfolios to develop students' writing: A practical guide for language teachers". Taylor & Francis, (2022).
- [17] Gayed, J. M., Carlon, M. K. J., Oriola, A. M., & Cross, J. S., "Exploring an AI-based writing assistant's impact on English language learners" *Computers and Education: Artificial Intelligence*, 3, (2022).
- [18] Dizon, G., & Gayed, J. M., "Examining the impact of Grammarly on the quality of mobile l2 writing", *jalt call Journal*, 17(2), 74-92, (2021).
- [19] Nazari, N., Shabbir, M. S., & Setiawan, R., "Application of Artificial Intelligence powered digital writing assistant in higher education: randomized controlled trial". *Heliyon*, 7(5), (2021).
- [20] Lu, X., "Natural language processing and Intelligent Computer Assisted Language Learning (ICALL) " *The TESOL encyclopedia of English language teaching*, 1–6. (2018).
- [21] AlFarsi, G., Tawafak, R. M., Eldow, A., Malik, S. I., Jabbar, J., & Al Sideiri, A., "Smart classroom technology in artificial intelligence: A review paper". In *International Conference on Culture Heritage, Education, Sustainable Tourism, and Innovation Technologies*, 229–235, (2021).
- [22] Kukulska-Hulme, A., & Lee, H. (2020). *Intelligent assistants in language learning: analysis of features and limitations*. CALL for widening participation: short papers from EUROCALL 2020, 1(1), 172-176.
- [23] Baker, T., & Smith, L., "Educ-AI-tion rebooted? Exploring the future of artificial intelligence in schools and colleges", *Nesta*, (2019). Retrieved from *Nesta Foundation website*: https://media.nesta.org.uk/documents/Future_of_AI_and_education_v5_WEB.pdf
- [24] Perdana, I., & Farida, M., "Online grammar checkers and their use for EFL writing ", *Journal of English Teaching, Applied Linguistics and Literatures*, 2 (2), 67-76, (2019).
- [25] Dale R. and Viethen J., "The automated writing assistance landscape in 2021, *Natural Language Engineering*". 27(4), 511–518, (2021).
- [26] Perdana, I., & Farida, M., "Online grammar checkers and their use for EFL writing ", *Journal of English Teaching, Applied Linguistics and Literatures*, 2 (2), 67-76, (2019).
- [27] Grimes, D., & Warschauer, M., "Utility in a fallible tool: A multi-site case study of automated writing evaluation", *The Journal of Technology, Learning, and Assessment*, 8(6), 1-44, (2010).
- [28] Sommers, N., "Revision strategies of student writers and experienced adult writers", *College composition and communication*, 31(4), 378-388, (1980).
- [29] Barrot, J.S., "Integrating technology into ESL/EFL writing through grammarly", *RELC Journal*, 0033688220966632, (2020).
- [30] Fitria, T.N., "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, (2021).
- [31] Kinga S, Gupta GS., "Platforms as Foundation of Sharing Economy". *Delhi Business Review*, 22(1), 1-13, (2021).
- [32] Fitria TN., "Avoiding Plagiarism of Students' Scientific Writing by Using the QuillBot Paraphraser. Elsyia " , *Journal of English Language Studies*, 4(3), (2022).
- [33] Razack HIA, Mathew ST, Saad FFA, Alqahtani SA., "Artificial intelligence-assisted tools for redefining the communication landscape of the scholarly world", *Science Editing*, 8(2), 134-144, (2021).
- [34] Pongpuehee S, Prachanant N, Ruangpaisan S., " Essay Writing Challenges encountered by Thai Students in EFL Context". *Editorial Board*, 132, (2022).

- [35] Chen, X., Xie, H., Zou, D., & Hwang, G. J., "Application and theory gaps during the rise of artificial intelligence in education", *Computers and Education: Artificial Intelligence*, 1, 100002, (2020).
- [36] Hinojo-Lucena, F. J., Aznar-Díaz, I., C´aceres-Reche, M. P., & Romero-Rodríguez, J. M., "Artificial intelligence in higher education: A bibliometric study on its impact in the scientific literature", *Education Sciences*, 9(1), 51, (2019).
- [37] Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F., "Systematic review of research on artificial intelligence applications in higher education - where are the educators?", *International Journal of Educational Technology in Higher Education*, 16(1), 1-27, (2019).
- [38] Tang, K. Y., Chang, C. Y., & Hwang, G. J., "Trends in artificial intelligence-supported e-learning: A systematic review and co-citation network analysis (1998–2019)", *Interactive Learning Environments*, 1–19, (2021).
- [39] Kabudi, T., Pappas, I., & Olsen, D. H., "AI-enabled adaptive learning systems: A systematic mapping of the literature", *Computers and Education: Artificial Intelligence*, 2, 100017, (2021).
- [40] Boud, D. & Soler, R., "Sustainable assessment revisited", *Assessment & Evaluation in Higher Education*, 41(3), 400-413, (2016).
- [41] McMillan, J.H., & Hearn, J., "Student self-assessment: The key to stronger student motivation and higher Achievement", *Educational Horizons*, 87(1), 40-49, (2008).
- [42] Blume, C., Schmidt, T., & Schmidt, I., "An imperfect union? Enacting an analytic and evaluative framework for digital games for language learning" *Zeitschrift für Fremdsprachenforschung: ZFF*, 28 (2), 209-231, (2017).
- [43] Bates, T., Cobo, C., Mariño, O., & Wheeler, S., "Can artificial intelligence transform higher education?", *International Journal of Educational Technology in Higher Education*, 17(1), 1-12, (2020).

BIOGRAPHIES

Alireza Allahyari is an assistant professor of Control Systems Engineering at the Department of the Mechanical Engineering of the Iranian Research Organization for Science and Technology. He received his Ph.D. from the University of Sheffield, UK. His special areas of interests include control systems and AI.

Maryam Rezaee received her Ph.D. in TEFL from the Faculty of Foreign Languages and Literatures, University of Tehran. Her research interests include vocabulary studies and CALL.