Empowering Female Students with AI: Improving Writing Skills in Higher Education

S. Meena Priyadharshini[1] & Bavya S[2]

Abstract

Girls face unique, gender-based barriers in education, missing out on many privileges and opportunities. To address these disparities, using AI-powered writing tools, such as grammar checkers and writing assistants can provide innovative solutions. This study explored their effectiveness in enhancing the writing skills of 20 postgraduate female students using action research methodology. Pre- and post-assessments, student surveys, teacher reflections, and guided AI interactions were conducted. The results revealed an average score improvement of 12.75 points, demonstrating significant advancements in grammar, vocabulary, structure, and writing confidence. Next, the qualitative feedback indicated that students found these tools user-friendly and instrumental in developing independent learning, while also increasing their motivation and self-expression. This study recommend that AI tools play a crucial role in linking existing educational gaps by providing personalized, timely feedback, ultimately creating fairer learning environments. This approach is particularly beneficial for female students facing barriers in their academic journey.

Keywords: Artificial Intelligence in Education; Developing Writing Skills in female Students; AI-Powered Writing Tools; Gender-Inclusive Education; Empower female Students.

INTRODUCTION

Writing is a fundamental skill. It has a significant impact on professional development, academic achievement, and even personal improvement. Many students still struggle to develop excellent writing abilities, for lots of reasons, including lack of individualized help, poor feedback, and restricted or nonexistent access to resources. For female students, especially those who reside in rural areas or are members of underprivileged communities, these challenges are frequently amplified. They face several societal constraints, gender biases, and cultural expectations that hinder their educational progress (UNESCO, 2020). Hence, it becomes important to develop effective strategies to address these barriers. It is also critical to create fair learning opportunities that empower female students and boost their academic performance.

We are now able to solve many challenges, that are related to education with the support of Artificial Intelligence (AI) technologies. To make life easier, various AI-powered tools such as writing assistants, prompt generators, grammar checkers, and content generators are being constantly created. This has transformed the way students used to learn and practice writing. These tools offer immediate feedback results on grammar, vocabulary, tone, structure, style, and indent. This helps students identify and correct errors to refine their writing skills and build confidence. By customizing support to suit every individual's learning needs, AI tools have the potential to bridge gaps in traditional education systems and create inclusive learning environments (Jegede, 2024).

For female students, AI tools can be especially advantageous. Numerous studies highlight that gender disparities in education are frequently tied to unequal access to resources and support systems. Girls in disadvantaged communities often face extra hurdles in developing essential skills, such as writing (UNICEF, 2019). AI-powered writing tools offer a way to reduce these disparities by providing consistent, objective, and accessible assistance, regardless of socio-economic or geographical limitations. Additionally, autonomous learning can be achieved with the help of these tools, encouraging students to

[1] Head & Director i/c, Department & Centre for Women's Studies, Research & Extension Centre, Mother Teresa Women's University. drmeenapriyadharshini@gmail.com

[2] Research Scholar, Department of English, Mother Teresa Women's University. bavyamaniam@gmail.com

actively engage in the writing process, which is a crucial aspect of developing long-term skills (Sottilare et al., 2014).

The Amalgamation of AI tools in educational practices is increasing drastically. The United Nations' Sustainable Development Goal 4 emphasizes the need for inclusive and equitable quality education for all (United Nations, n.d.). The United Nations' (2015) Millennium Development Goals Report highlights the importance of reducing gender disparities in education and empowering girls. Educational institutions can integrate advanced AI technologies to enhance teaching and learning, thereby contributing to this global objective.

This study aims to investigate how AI tools develop the writing skills of girl students in a postgraduate setting. The findings of this study will contribute to the growing dialogue on the role of AI in education and emphasize its potential to empower female learners by advancing their academic and professional capabilities.

LITERATURE REVIEW

Integration of AI in Educational Writing

Recent studies have revealed that AI powered writing tools are effective in educational settings. Notably, AI writing assistants were found to improve the content and organization of student essays. This helped in the improvement of their writing quality (Jegede, 2024). A study on Omani EFL learners' observations of using AI tools to develop writing skills has found that the tools helped the learners to develop their writing skills with no major differences between the male and female students (Al-Raimi et al., 2024; Mudhsh et al., 2023). Additionally, research has emphasized the potential of AI-powered pedagogies in refining academic writing skills. For example, Dong (2023) explored AI-assisted English writing instruction and highlighted that AI-driven feedback mechanisms significantly aid students in structuring and refining their essays. Similarly, a mixed-methods study on AI-assisted learning found that AI-driven tools positively impact writing skills among non-native language learners, particularly in improving sentence construction and coherence (Chen & Gong, 2025).

Gender Disparities and AI Adoption

Despite the potential benefits of AI in education, gender disparities do persist in the adoption of these technologies. Research highlights that woman have about 20% lower odds of using generative AI tools compared to men, suggesting underlying social, cultural, and institutional frictions (Otis et al., 2024). This gap underscores the need for targeted interventions to encourage the usage of AI tools among female students. Mishra (2024) further emphasizes that AI technologies can serve as catalysts for women's empowerment, particularly in education and workforce development.

Addressing Gender Bias in AI Tools

The integration of AI in education also raises concerns about inherent gender biases within these tools. A study researching AI educational writing assistance found that large language models might spread existing gender stereotypes, potentially impacting female students' learning experiences (Nadeem et al., 2022). Therefore, it is crucial to judge and mitigate such biases to ensure unbiased learning environments.

Encouraging Marginalized Female Students

Inclusive AI education can empower marginalized female students by leveraging their unique strengths. Studies indicate that AI-driven learning environments can support personalized feedback and self-directed learning, benefiting students from disadvantaged backgrounds (Shahsavar et al., 2024). AI tools provide instant, objective assistance, which can help female students build confidence in their writing abilities while mitigating the effects of limited access to educational resources (Meharunisa et al., 2024).

In summary, while AI tools hold promise for enhancing writing skills, it is imperative to address gender disparities and biases to create an inclusive educational environment. Further research is needed to develop strategies that encourage AI adoption among female students and ensure that these tools support equitable learning outcomes.

OBJECTIVES

This study intends to investigate the potential of AI-powered tools in transforming educational practices, particularly in improving the writing skills of postgraduate female students. The specific goals of this research are:

- To evaluate the effectiveness of AI tools in enhancing the writing skills of female students, with a focus on measurable improvements in

grammar, vocabulary, and overall writing structure.

- To analyze the impact of AI-powered writing assistants in stimulating linguistic accuracy and coherence.
- To measure how individualized feedback from AI tools enhances students' confidence and self-expression in their writing.
- To weigh the capacity of AI tools to provide personalized support for diverse learning needs within a classroom setting.
- To assess the significance of AI tools in promoting gender-inclusive education by enabling female students with higher academic and linguistic competencies.
- To gather and analyze feedback from students and educators, permitting refinement and optimization of AI tool integration in educational contexts.
- To add to the broader discussion on incorporating AI technology in education, with a focus on its potential for skill development and its contribution to gender equality.

METHODOLOGY

Research Design

This study utilised an action research methodology to check the effectiveness of AI-powered tools in improving the writing skills of female postgraduate students. Action research was opted because it assists a cyclical process of planning, implementing, observing, and reflecting. This iterative aspect method allowed continuous improvements to teaching strategies and involvements throughout the study (McNiff, 2017).

Research Method

A mixed-methods approach was used to collect both quantitative and qualitative data. The quantitative data was gathered through pre- and post-assessments of students' writing skills. While the qualitative data immersed in surveys and focus group discussions to obtain the students' experiences with the AI tools.

Participants and Sampling

The study included 20 postgraduate female students, selected through purposive sampling. This technique was employed to warrant a distinct representation of writing proficiency levels among participants, granting meaningful insights into the impact of AI tools. The participants were enrolled in various postgraduate programs and voluntarily agreed to take part in the study. The manageable sample size enabled close monitoring of each student's progress throughout the intervention.

Tools and Instruments

The major tools used were Grammarly and ProWritingAid, which presented immediate feedback on aspects such as grammar, spelling, style, and structure. These tools helped students revise and improve their writing assignments. Writing tests (Pre- and Post-Assessments) were given at the start and end of the study to measure students' progress by comparing their scores before and after the intervention.

Procedure

Students took a Pre-Assessment writing test to evaluate their starting level in grammar, vocabulary, coherence, and structure. During the study, they completed writing tasks using AI tools. Teachers guided them in learning how to use these tools to improve their writing. The tools provided quick feedback, allowing students to fix mistakes on their own. After the study, students were given another writing test (post-Assessment) to measure how much they had improved overall. Finally, the results of the pre- and post-assessments were compared to evaluate each student's individual progress. Lastly, surveys and group discussions were conducted to understand the students' experiences, their thoughts on using AI tools, and any difficulties they faced.

Data Analysis

The quantitative analysis looked at improvements in grammar, vocabulary, coherence, and overall writing structure. The pre-assessment scores, with an average of 29.25, showed students' starting level. After the intervention, the post-assessment scores went up to an average of 42.00. This increase showed a mean improvement of 12.75 points. A paired t-test was conducted to determine the statistical significance of these results. So, the test confirmed that the improvements were noticeably high ($p < 0.01$). These findings guaranteed the effectiveness of AI-powered tools in improving writing skills.

Each participant improved significantly, with scores increasing between 11 and 15 points. The highest gain was 15 points, and the lowest was 11 points. These results portrayed that everyone made progress. The intervention helped all participants, no matter their starting skill levels.

In addition to quantitative findings, the qualitative data revealed critical insights into students' experiences with AI tools. Thematic analysis of the survey responses and focus group discussions identified recurring patterns. Many students reported significant improvements in grammar and vocabulary usage, attributing these to the real-time feedback provided by the tools. The most prominent outcome of this study was seen as students drafted and revised their written works with confidence. The participants expressed greater ease and independence in addressing their writing challenges.

The AI tools were praised for being easy to use and giving helpful, personalized suggestions. Many students said the tools helped them become more independent by letting them find and fix mistakes on their own. This autonomy was particularly valued, as it aligned with the broader goal of cultivating independent learning skills.

DISCUSSION

The findings of this study demonstrate significant improvements in the writing skills of postgraduate female students after incorporating AI-based writing assistance into their academic practices.

Interpretation of Quantitative Findings

The quantitative results demonstrated a statistically significant improvement in students' writing proficiency, with a mean score increase of 12.75 points ($p < 0.01$). The consistent progress observed among all participants suggests that AI tools are effective and equitable, benefiting students across varying levels of proficiency.

The ability of the tools in providing real-time, personalized feedback likely contributed to these improvements. Studies have shown that timely feedback results in better learning outcomes by enabling students to immediately correct errors and understand language usage nuances (Shute, 2008). By offering individualized suggestions, AI tools can bridge the gap in traditional classroom settings, where personalized attention may be limited.

Insights from Qualitative Findings

The qualitative data revealed that students valued the autonomy facilitated by AI tools. Thematic analysis highlighted key benefits, such as improved confidence in writing, ease of use, and the ability to identify and rectify errors independently. These findings echo the work of

Sottilare et al. (2014), who emphasized that self-directed learning is a critical outcome of integrating intelligent tutoring systems.

The role of AI tools in building self-efficacy is particularly important for female students in underprivileged contexts. UNESCO (2020) highlights that gender disparities in education stem primarily from unequal access to resources and support systems.

FINDINGS

The results highlight the effectiveness of AI-driven tools in enhancing the writing skills of postgraduate female students.

Quantitative Findings

The analysis of students' writing scores before and after using AI tools showed a big improvement. The students scored an average of 29.25 in the pre-assessment tests. And in the post-assessments tests the scores increased to 42.00. This means their scores went up by 12.75 points. A paired t-test is a way to check if the improvement is real and not just by chance. This test was conducted to confirm that this improvement was significant ($p < 0.01$). This shows that the AI tools helped students improve their overall writing skills. Every student made progress, with their individual scores increasing between 11 and 15 points.

Table 1 below shows the detailed account of individual scores, highlighting the progress made by each participant.

Table 1: *Participants' Scores*

Participant	Pre-Assessment Score (Out of 50)	Post-Assessment Score (Out of 50)	Improvement
1	28	40	12
2	30	45	15
3	32	44	12
4	25	38	13
5	29	42	13
6	34	46	12
7	27	39	12
8	33	47	14
9	31	43	12
10	26	37	11
11	24	36	12
12	28	41	13
13	29	43	14

14	26	39	13
15	30	44	14
16	35	48	13
17	27	40	13
18	32	45	13
19	31	43	12
20	30	42	12

Table 1 confirm consistent improvement by all participants, while Table 2 highlights the overall trends in performance metrics. These results demonstrate the benefits of the intervention and the effectiveness of AI tools in enhancing the female students' writing skills.

Table 2 below summarizes the key metrics from the whole assessment results.

Table 2: *Summary of Pre- and Post-Assessment Metrics*

Metric	Pre-Assessment Mean	Post-Assessment Mean	Improvement (Mean)
Average Score	29.25	42.00	12.75
Highest Score	35	48	13
Lowest Score	24	36	12

Qualitative Findings

The thematic analysis of the surveys and focus groups shed light on students' experiences with AI-powered tools. Students highlighted significant improvements in their grammar and vocabulary, crediting tools like Grammarly and ProWritingAid for their real-time feedback. Many expressed that the personalized and constructive guidance from these tools boosted their confidence in drafting, revising, and completing their writing tasks. They appreciated the tools' user-friendly and intuitive design, which made it easy to incorporate the suggested changes into their work. Furthermore, these tools promoted self-learning by enabling students to recognize and correct their mistakes independently, leaving them feeling more empowered and self-reliant.

The combined findings from the qualitative and quantitative data reveal that these tools enhance technical writing skills and build students' confidence. Additionally, they appear to have built greater engagement with the writing process.

The results of this research contribute to the larger dialogue surrounding the use of technology in educational settings, especially as they apply to equity and inclusion. The use of AI-powered tools resonates with the United Nations' Sustainable Development Goal 4, which aims for inclusive and equitable quality education (United Nations, 2015). These tools have the potential to transform traditional methods of teaching by catering to individual learning needs and enhancing students' self-confidence.

However, AI-based writing assistants, despite their benefits, may oversimplify complex writing issues, leading to formulaic feedback rather than promoting deep critical engagement (Nadeem et al., 2022). Additionally, over-reliance on AI tools could lead to a decline in critical thinking and problem-solving skills if they are not integrated with guided instruction (Dong, 2023).

Limitations of the Study

While this study offers valuable insights into the effectiveness of AI-based tools in enhancing the writing skills of postgraduate female students, it is not without limitations. As the results come from a small sample of only 20 students and from a single institution, they may lack the applicability to larger and diverse populations. Moreover, the present six-week intervention period assessed short-term benefits and calls into question the sustainability of the observed benefits in the long run.

Qualitative data were based on self-reported feedback via surveys and focus group discussions. Although these qualitative approaches afforded abundant insight, they are also prone to biases including social desirability or recall bias. Moreover, the study also did not control for contextual factors, including access to technology, socio-economic backgrounds, or previous experience with AI tools, which could also affect the results.

We did not examine the inherent limitations in the AI tools themselves. Tools like Grammarly and ProWritingAid may reduce complex writing problems to simple metrics or echo algorithmic biases that may subject users to different treatment. There was also a lack of depth in terms of interaction with traditional teaching methods, suggesting further exploration of finding a way to effectively incorporate these technologies into the broader pedagogical landscape.

The study still serves as a solid basis for understanding the opportunities AI tools can

provide for education and emphasizes why future research needs to take these limitations into account.

Recommendations for Future Research

Further studies could investigate the long-term effect of using AI tools on the quality of the writing on a global basis and among heterogeneous educational settings. Exploring whether these tools can be adjusted to meet the specific needs of students in rural or resource-poor environments would be a great learning experience. Additionally, understanding how teacher-provided feedback interacts with suggestions brought forth by AI could shed light on how to best balance the role of technology with traditional educational methods.

CONCLUSION

Hence this study proved AI-based tools enhance postgraduate female students writing proficiency. These tools also offer tailored recommendations that result in noticeable enhancements in grammar, vocabulary, and overall writing skills. Learners also reported improved confidence and independence in their writing, signalling the transformative impact of AI on education.

The study's small sample size and duration indicate a need for additional research, but the findings offer an illustration of how AI tools might be used to address gaps in education and improve equity. Educators have an opportunity to empower learners by leveraging such technologies to create more inclusive and effective learning environments.

REFERENCES

Al-Raimi, M., Mudhsh, B. A., Alyafaei, Y., & Almaashani, S. (2024). Utilizing artificial intelligence tools for improving writing skills: Exploring Omani EFL learners' perspectives. *Forum for Linguistic Studies, 6*(2), 1177. https://doi.org/10.59400/fls.v6i2.1177

Chen, C., & Gong, Y. (2025). The role of AI-assisted learning in academic writing: A mixed-methods study on Chinese as a second language students. *Education Sciences, 15*(2), 141. https://doi.org/10.3390/educsci15020141

Dong, Y. (2023). Revolutionizing academic English writing through AI-powered pedagogy: Practical exploration of teaching process and assessment. *Journal of Higher Education Research, 4*(2), 52. https://doi.org/10.32629/jher.v4i2.1188

Jegede, O. (2024). Artificial intelligence and English language learning: Exploring the roles of AI-driven tools in personalizing learning and providing instant feedback. *Universal Library of Languages and Literatures, 1*(2), 6–19. https://doi.org/10.70315/uloap.ullli.2024.0102002

McNiff, J. (2017). *Action research: All you need to know*. SAGE Publications.

Meharunisa, S., Almugren, H., Sarabdeen, M., Mabrouk, F., & Kijas, A. C. M. (2024). The impact of artificial intelligence on women's empowerment, and work-life balance in Saudi educational institutions. *Frontiers in Psychology, 15*, 1432541. https://doi.org/10.3389/fpsyg.2024.1432541

Mishra, M. (2024). Empowering women through AI - An anticipation.

Mudhsh, B. A., Al-Maashani, S., Al-Raimi, M., & Al-Amri, K. (2023). A cross-sectional study of Omani EFL students' competency in using English grammatical aspect categories. *Theory and Practice in Language Studies, 13*(11), 2755–2762. https://doi.org/10.17507/tpls.1311.04

Nadeem, A., Marjanovic, O., & Abedin, B. (2022). Gender bias in AI-based decision-making systems: A systematic literature review. *Australasian Journal of Information Systems, 26*. https://doi.org/10.3127/ajis.v26i0.3835

Otis, N. G., Delecourt, S., Cranney, K., & Koning, R. (2024). Global evidence on gender gaps and generative AI. *Harvard Business School Working Paper Series, (25-023)*. Retrieved from https://www.hbs.edu/ris/download.aspx?name=25-023.pdf

Shahsavar, Z., Kafipour, R., Khojasteh, L., & Pakdel, F. (2024). Is artificial intelligence for everyone? Analyzing the role of ChatGPT as a writing assistant for medical students. *Frontiers in Education, 9*. https://doi.org/10.3389/feduc.2024.1457744

Shute, V. (2008). Focus on formative feedback. *Review of Educational Research, 78*(1), 153–189. https://doi.org/10.3102/0034654307313795

Sottilare, R., Grasser, A., Hu, X., & Goldberg, B. (2014). *Design recommendations for intelligent tutoring systems, Volume 2: Instructional management*.

UNESCO. (2020). *Global education monitoring report: Inclusion and education – All means all*. UNESCO Publishing.

UNICEF. (2019). *State of the world's children: Children, food, and nutrition – Growing well in a changing world*. UNICEF.

United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. United Nations.

United Nations. (n.d.). *Goal 4: Quality education*. United Nations Sustainable Development Goals. https://sdgs.un.org/goals