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Improving Academic Writing Skills through Artificial Intelligence-Based Training

Retno Lestari[1*], Heni Dwi Windarwati[2], Yati Sri Hayati[3], Marcellina Tiarani Putri[4], Jennifer Aishah Ratu Bernardy[5], Juwita Nindya Kartika[6]

[1,2,3,4,5,6] Department of Nursing, Faculty of Health Sciences, Universitas Brawijaya, Malang, East Java, Indonesia

ABSTRACT

Background: *The integration of artificial intelligence (AI) into academic environments has been on the rise to enhance research productivity and improve the quality of academic writing. Despite the growing interest in this area, empirical evidence on the measurable impact of AI-based training on academic writing skills remains limited. The aim of this community service activity was to enhance the participants' academic writing skills through a structured AI-assisted training program.*

Methods: *This community service program was conducted over a three-day period in May 2025 at the Faculty of Health Sciences, Universitas Brawijaya, Indonesia. A total of 30 university students volunteered to participate in this study. The community service program comprised five stages: preparation, socialization, training implementation, and evaluation. The training methods included socialization, counseling, workshops, and hands-on practicums focusing on AI-based academic writing. The evaluation was executed employing a pretest–posttest design, in which a writing rubric was used to assess the participants' academic writing skills.*

Results: *The analysis indicated a significant improvement in writing performance following the AI-based training. The mean pretest score was recorded at 65.3 (SD = 7.5), while the posttest mean reached 81.2 (SD = 6.8). The paired-sample t-test highlighted a statistically significant difference between the pretest and posttest scores ($t = 8.24$, $df = 29$, $p < 0.001$).*

Conclusion: *The AI-based academic writing training implemented through this community service program effectively enhanced the participants' writing skills. This program demonstrates that AI-assisted training can be an effective model for strengthening academic writing competence in community service initiatives.*

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CONTACT
Retno Lestari
retno.lestari.fk@ub.ac.id
Puncak Dieng Eksklusif, Kunci, Kalisongo, Kecamatan Dau, Kabupaten Malang, Jawa Timur 65151, Indonesia

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INTRODUCTION

The ability to compose scientific articles is a vital skill for academics, researchers, and students, as it serves as the primary means of sharing knowledge and achieving recognition within the scientific community (1,2). Effective scientific writing requires a

combination of critical thinking, a well-structured argumentative format, and the use of precise academic language (3). Nonetheless, numerous studies indicate that many novice writers encounter significant hurdles when it comes to articulating coherent arguments, maintaining a consistent writing style, and employing grammar that aligns with the rigorous standards expected in international publications (4,5).

In recent years, advancements in artificial intelligence (AI) technology have created promising opportunities to enhance academic writing abilities. AI tools such as sophisticated language models, automated feedback systems, and intelligent tutoring platforms have been demonstrated to assist writers in refining their sentence structures, improving text cohesion and coherence, and automatically correcting grammatical errors (6,7). Research suggests that incorporating AI into writing education can streamline the revision process, alleviating some of the cognitive burden on writers and enabling them to concentrate more effectively on developing their ideas and arguments (8).

Moreover, training approaches that leverage AI offer a more customised learning experience by delivering real-time feedback and adaptable support tailored to the specific needs of each participant. This concept aligns with the principles of technology-enhanced learning, which underscores the role of technology in fostering active and reflective learning processes (9). Within the realm of academic writing, the integration of AI extends beyond mere technical assistance, evolving into a metacognitive learning tool that helps participants identify error patterns and develop more effective writing strategies (10).

However, the literature also highlights the challenges associated with incorporating AI into scientific writing. Several studies caution that an overreliance on AI tools could stifle writers' creativity and raise ethical concerns, including issues related to plagiarism, algorithmic bias, and the potential for inaccuracies generated by AI (often referred to as AI hallucination) (11–13). Thus, it is crucial that AI training be thoughtfully designed, adopting a balanced pedagogical approach that combines technological support with human oversight. This ensures that participants do not solely depend on machine-generated outputs but also nurture critical and evaluative thinking skills.

This community service activity was carried out at the Faculty of Health Sciences, Brawijaya University, Malang, Indonesia. The partners in this activity were students who still experienced various obstacles in academic writing, particularly limited experience in systematically compiling scientific papers in accordance with scientific principles. In addition, the use of artificial intelligence (AI) technology in the writing process has not been optimized and used responsibly, thus potentially causing academic ethical issues and low-quality writing. These conditions underline the implementation of this program, considering that good academic writing skills and proper AI literacy are important competencies for students in the health field.

This community service activity aims to improve participants' academic writing skills through structured, artificial intelligence–based training. Specifically, the activity seeks to: (a) provide practical knowledge and experience utilizing AI tools for academic writing; (b) improve the ability to structure, revise, and refine scientific manuscripts according to academic standards; and (c) raise awareness of ethical and responsible AI use in scholarly writing.

METHODS

Community service activities are scheduled to take place at the Faculty of Health Sciences, Universitas Brawijaya, in Malang, Indonesia, in May of 2025. The program is designed to span three consecutive days, incorporating a combination of face-to-face workshops and guided practice sessions. Students participating in the program contribute to the execution of activities by offering assistance to faculty members in the organization of sessions, the facilitation of small group discussions, the provision of technical support during workshops, the documentation of activities, and the assistance of participants during practical writing sessions. Additionally, they facilitate the distribution and collection of evaluation instruments.

This community service activity was carried out using a participatory and educational approach through training in academic writing based on artificial intelligence (AI). The implementation method was organized into several stages of interrelated activities, including preparation, socialization and counseling, training and workshops, practical assistance, and evaluation.

Preparation Stage

The preparation stage began with an assessment of the partners' needs to identify problems and the initial level of academic writing skills of the participants. The assessment was conducted through informal interviews and a diagnostic pretest on academic writing. The assessment results were used as the basis for developing training materials, determining learning methods, and selecting AI tools relevant to the participants' needs.

Implementation Stage

The implementation of this community service activity was driven by the objective of enhancing academic writing skills through the utilization of artificial intelligence–based training methodologies that are participatory and practice-oriented. The program integrated various educational methodologies, including counselling, training, workshops, and hands-on practicums, to address the writing challenges encountered by the partner community. The implementation method is delineated by enumerating the roles of lecturers and students, the location and time of the activity, the partner profile, and the stages of implementation from preparation to monitoring and evaluation.

The lecturers performed the roles of facilitators and mentors throughout the duration of the community service program. The activities conducted by the lecturers included the following: (a) Socialization and Counselling: The objectives of this community service program are to introduce the activity's purpose, to identify common academic writing issues encountered by participants, and to offer guidance on the ethical and responsible use of artificial intelligence (AI) in academic writing; (b) Training and Workshops: The following workshops are designed to provide structured training in academic writing skills. The workshops cover such topics as the structure of scientific articles (IMRaD), the development of arguments, the principles of coherence, and the use of academic language. The workshops centred on the pragmatic implementation of AI-based instruments, including ChatGPT, Grammarly, and paraphrasing applications, to facilitate writing and revision procedures; and (c) Mentoring and Practical: Guiding participants through hands-on writing practices, Providing direct feedback on draft manuscripts, Mentoring participants during the revision process using AI-assisted feedback.

Evaluation Stage

The evaluation stage is conducted to assess the effectiveness of the program through a pretest–posttest design. Academic writing skills are assessed using an assessment rubric that covers aspects of structure, coherence, use of academic language, and quality of argument. The evaluation data is analyzed descriptively to see the change in average scores and the improvement in participants' academic writing skills after participating in the entire series of activities.

RESULTS

This section presents the results of the community service program based on each implementation stage, from preparation to evaluation. These findings illustrate the process results and the measurable impact of AI-based academic writing training. A preliminary needs assessment was conducted through informal interviews and a diagnostic pretest to identify participants' baseline academic writing competencies. Most participants experienced difficulties in structuring scientific articles according to the IMRaD format, developing coherent arguments, and maintaining academic language consistency. Limited prior exposure to AI-assisted writing tools was also identified. These findings were used to design targeted training materials and select appropriate AI tools that were aligned with the participants' needs.

The socialization and counseling stage introduces the community service program's objectives and raises awareness of the ethical and responsible use of AI in academic writing. At this stage, participants have demonstrated a more profound comprehension of the program's objectives and have actively engaged in discussions concerning academic integrity, plagiarism risks, and writing responsibilities. The Q & A session demonstrated that the participants began to perceive AI as a supportive instrument rather than a replacement for human cognitive processes.

The training sessions and workshops significantly improved the participants' conceptual understanding of academic writing. The participants exhibited enhanced comprehension of the structural elements of scientific articles, including the development of arguments and paragraph cohesion. In addition, the participants demonstrated improved adherence to academic language conventions. Participants were able to identify grammatical errors, improve sentence clarity, and organize ideas more logically through practical activities involving artificial intelligence (AI) tools such as ChatGPT and Grammarly. A survey of the workshop participants revealed that they experienced an increase in confidence in the application of AI-supported feedback for refining their drafts.

The participants engaged in guided writing and revision activities during the tutoring and practice sessions under the supervision of lecturers. The integration of AI-driven feedback with direct guidance has been demonstrated to facilitate the effective revision of scholarly manuscripts, particularly in the Introduction and Discussion sections. The use of reflective journals enhances self-regulation skills, awareness of writing strategies, and confidence in revising academic texts. The participants reported that AI feedback has been instrumental in identifying previously unnoticed weaknesses in coherence and argument flow.

The evaluation stage was conducted using a pretest–posttest design to assess the overall effectiveness of the program. Descriptive statistics in Table 1 indicated a

substantial enhancement in the academic writing performance of the participants following their engagement in AI-based training.

Table 1. Comparison of Academic Writing Scores Before and After the AI-Based Training Program (n = 30)

Measurement	Mean ± SD	Mean Difference	t (df)	p-value
Pretest	65.3 ± 7.5	15.9	8.24 (29)	< 0.001
Posttest	81.2 ± 6.8			

The mean pretest score was 65.3 (SD = 7.5), indicating moderate initial writing ability (Table 1). Following the culmination of all training stages, an average post-test score of 81.2 (SD = 6.8) was attained, denoting a substantial enhancement in academic writing aptitudes. A subsequent paired-sample t-test confirmed statistically significant improvement ($t = 8.24$, $df = 29$, $p < 0.001$).

The substantial effect size (Cohen's $d > 0.8$) signifies that structured and gradual AI training programs exert a considerable and substantial impact on the capacity of participants to organize, articulate, and refine academic writing. The findings indicate that the sequential implementation of the preparation, socialization, training, guidance, and evaluation stages effectively enhances the participants' academic writing competence.

Figure 1. Training Activities on Improving Academic Writing Skills Through Artificial Intelligence-Based Training

DISCUSSION

These findings align with a growing body of research emphasising the beneficial effects of AI-assisted tools on various aspects of writing performance, feedback processing, and self-regulated learning. For instance, a recent study that demonstrated that AI writing assistants can boost text fluency and enhance the coherence of arguments by providing real-time scaffolding and contextual feedback (14). Similarly, AI-driven writing systems not only improve learners' linguistic confidence but also significantly

enhance their motivation through mechanisms that offer adaptive feedback and revision tracking (15).

The responses from many participants reinforce these quantitative findings, as they expressed appreciation for the AI-assisted tools that revealed weaknesses in their writing structure and coherence, which they had previously overlooked. One participant remarked in daily refelctive journal, “The AI feedback helped me see how my argument drifted off topic, allowing me to reorganise my section more logically, which I had never considered before.” Another participant emphasised the motivational aspect of the experience, stating, “The instant suggestions from the AI tool provided me with confidence, indicating that my writing was improving with every revision I made.”

This perspective is corroborated by previous study, who highlight that immediate, context-sensitive feedback provided by AI tools not only fosters greater learner engagement but also boosts self-efficacy in academic writing (16). In addition, the act of maintaining daily reflective journals emerged as a significant practice that facilitated metacognitive growth, as participants became increasingly aware of their own learning processes and writing strategies. This phenomenon has also been identified in previous studies as being crucial for sustainable development in writing skills (17,18).

The AI-supported feedback system empowered participants to effectively bridge the gap between linguistic form and academic reasoning, transforming feedback into actionable learning opportunities. This is consistent with recent evidence suggesting that AI tools serve as cognitive mediators, enhancing writers’ metalinguistic awareness and improving their ability to manage cognitive load (19).

The dual approach of the training—combining structured workshops with reflective journal writing—appears to have significantly enhanced the learning outcomes. As contemporary frameworks in AI in education propose, such a blended model seamlessly integrates the benefits of automation (through AI feedback) with the vital aspect of reflection (encouraging self-regulated learning), resulting in deeper and more sustainable skill acquisition.

The implications of these findings are profound, highlighting the potential of AI-based training as a valuable and scalable model for enhancing academic capacities, particularly within higher education environments. By integrating AI tools into writing pedagogy, educators can promote learner autonomy, provide personalized feedback suited to individual needs, and cultivate reflective writing habits among both researchers and students.

Notwithstanding the favorable outcomes of the AI-based academic writing training, several impediments were identified during the implementation of the community service program. A significant challenge was the variation in participants' digital literacy, which influenced their ability to effectively interpret and apply AI-generated feedback, particularly during the initial stages of training. Moreover, concerns regarding ethical issues and academic integrity, such as fears of plagiarism and over-reliance on AI outputs, occasionally limited participants' confidence in utilizing AI tools optimally. Time constraints were identified as a significant limitation, as the three-day program duration-imposed constraints on the opportunities for individualized mentoring and iterative refinement of complex manuscript sections.

However, the findings also highlight the crucial importance of promoting ethical awareness in the adoption of AI technologies. Several participants expressed initial concerns about the authenticity of AI-generated suggestions, emphasizing the urgent need

for transparent discussions on academic integrity, authorship, and transparency when incorporating AI into scholarly writing instruction. In light of these challenges, it is recommended that future programs incorporate preliminary digital literacy assessments, systematically integrate ethical guidance on responsible AI use across all training stages, and extend the duration of mentoring or provide follow-up sessions to ensure more sustainable improvements in academic writing competence and critical engagement with AI-assisted tools.

CONCLUSIONS AND SUGGESTIONS

The community program demonstrated that the implementation of AI-based training for academic writing resulted in a substantial enhancement of participants' writing skills, as evidenced by elevated post-test scores. Participants also reported significant growth in their understanding of writing structure, self-regulation, and confidence through their reflective journals. The findings support the integration of AI in higher education writing instruction, as has been demonstrated to enhance both technical skills and reflective practices. The integration of AI workshops and daily reflective journals has been demonstrated to effectively combine automated feedback with personal reflection, thereby facilitating enduring enhancements in writing proficiency. For future community service activities, it is recommended that the program be supplemented with an initial digital literacy assessment, ongoing education on the ethical use of AI, and continued mentoring to ensure more sustainable improvement in academic writing skills.

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CONFLICT OF INTERESTS

The author declares that there is no conflict of interest regarding the results of this community service activity.

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