

## AI-Assisted Scientific Writing Training to Enhance the Professional Competence of Madrasah Teachers

Sita Nurmasitah\*, Adhi Kusumastuti, Samsudin Anis, Aryo Baskoro Utomo, Godham Eko Saputro

Universitas Negeri Semarang, Indonesia

\*Corresponding Author: [sita\\_nurmasitah@mail.unnes.ac.id](mailto:sita_nurmasitah@mail.unnes.ac.id)

---

### Abstract

The AI-assisted scientific writing training was implemented as a community service program to enhance the professional competence of madrasah teachers in the digital era. This activity aimed to equip teachers with the skills to write scientific articles, classroom action research reports, and best practice papers using artificial intelligence (AI) applications such as ChatGPT, Grammarly, QuillBot, and Mendeley. The training was conducted through hands-on practice and online mentoring using an experiential learning approach that emphasized real-world writing experiences. A total of 30 madrasah teachers participated in the program, which consisted of a pre-test, training sessions, writing practice, and a post-test. The results showed an average score improvement of 37%, particularly in aspects of writing structure, paragraph cohesion, academic language use, and reference management. Participants also demonstrated high enthusiasm and began developing independent scientific works for publication purposes. This activity proved that AI-based writing training effectively enhances teachers' academic productivity and strengthens digital literacy as part of continuous professional development.

**Keywords:** Teacher training, Artificial Intelligence, scientific writing, professional competencies, community service

---

### INTRODUCTION

Teachers are the key elements in the education system and play a strategic role in improving the quality of learning and national education standards. Enhancing teachers' professional competence is essential to enable them to adapt to the demands of the modern era, which increasingly emphasizes digital literacy, critical thinking, and academic productivity. One of the indicators of teachers' professionalism is their ability to write scientific works, including articles, classroom action research (CAR) reports, and *best practice* publications that serve as forms of reflection and innovation in teaching (McKeown et al., 2019; Rahim et al., 2023).

However, various studies have shown that many teachers, particularly those in madrasahs (Islamic schools), still face challenges in producing scientific papers. The main obstacles commonly identified include limited time, insufficient understanding of research methodology, and a lack of self-confidence in writing (Rashid et al., 2021). Furthermore, the lack of supporting facilities such as internet access, digital devices, and professional mentoring has slowed down the development of teachers' academic writing skills (Strobl et al., 2019). This condition has resulted in the low participation of madrasah teachers in academic publications and continuous professional development activities.

With the advancement of technology, Artificial Intelligence (AI) offers innovative solutions that can assist teachers in the process of academic writing. Various AI-based applications such as ChatGPT, Grammarly, QuillBot, and Mendeley can help writers structure their texts, correct grammatical errors, perform paraphrasing, and manage citations and bibliographies automatically (Khalifa & Albadawy, 2024). The integration of AI not only enhances time efficiency but also provides scaffolding support for teachers to produce more systematic and academically sound writing (Kim & Kim, 2022).

Nevertheless, teachers' digital literacy and their ability to use AI for academic purposes remain limited. Many teachers do not yet fully understand the potential of AI and often perceive it as a complex and intimidating technology. Therefore, it is necessary to implement practical, contextual, and experience-based training and mentoring programs that enable teachers to utilize AI effectively and ethically in scientific

writing (Setyawan et al., 2022).

This community service program was conducted to address these challenges by organizing AI-assisted scientific writing training for madrasah teachers. The program adopted an *experiential learning* approach, allowing participants to learn through direct experience and reflection on the learning process. The training not only focused on the technical aspects of using AI tools but also aimed to build teachers' confidence and motivation to produce high-quality and ethical academic works.

Accordingly, this program is expected to make a tangible contribution to enhancing the professional competence of madrasah teachers in the digital era. In addition to improving writing skills and academic productivity, the training also strengthened teachers' digital literacy as part of 21st-century educational transformation. This initiative serves as a model of community service that aligns with national education policies on digitalization and teacher capacity building through technology integration (Akour & Alenezi, 2022).

## METHOD

The method employed in this community service program was the training method, as the primary objective of the program was to enhance madrasah teachers' skills and competencies in scientific writing through the utilization of Artificial Intelligence (AI). This method was chosen to provide participants with direct hands-on experience in applying digital technologies as a solution to the low levels of academic literacy and scientific writing proficiency commonly found among madrasah teachers.

The training was designed using an experiential learning-based community education approach, in which participants learn through stages of concrete experience, reflection, and direct application of newly acquired skills. This approach has been proven effective for technology-oriented community service activities, as it positions participants as active subjects within the learning process (Kolb & Kolb, 2017).

The training program consisted of the following stages:

1. Problem identification and needs analysis, conducted through preliminary surveys and interviews with madrasah teachers to determine their level of understanding and the challenges they face in scientific writing.
2. Development of training modules and guidelines, including materials on the structure of scientific writing, academic paraphrasing techniques, writing ethics, and the use of AI applications such as ChatGPT, Grammarly, QuillBot, and Mendeley.
3. Implementation of face-to-face training, conducted over two days through interactive lectures, demonstrations, and hands-on practice using digital devices.
4. Online mentoring, carried out for four weeks following the training via Google Docs and WhatsApp groups, providing ongoing writing guidance and feedback on participants' draft manuscripts.
5. Program evaluation, conducted using pre-test and post-test instruments to measure participants' improvement, along with questionnaires to assess satisfaction and perceived usefulness of the training.

The training materials were organized thematically to align with participants' needs and the contextual challenges faced by madrasah teachers. The content covered an introduction to the fundamental concepts of teachers' scientific writing, highlighting its importance for career development and professional growth. Participants were also taught techniques for writing scientific articles, classroom action research (CAR) reports, and *best practice* documentation as reflective outputs of instructional innovation. The training further included sessions on the use of AI in scientific writing, encompassing skills such as developing outlines, editing and refining academic language, paraphrasing, and managing references automatically through applications like ChatGPT, Grammarly, QuillBot, and Mendeley. Additionally, the ethical aspects of academic writing were emphasized, including the responsible and ethical use of AI to maintain the integrity and originality of written work.

Through this training method, madrasah teachers not only gained new knowledge but also practical skills that enabled them to independently produce scientific works supported by technology. The results indicate that training accompanied by hands-on practice and sustained mentoring is more effective in improving scientific writing competence than theoretical instruction alone.

## RESULTS AND DISCUSSION

### Implementation of the Program

The AI-assisted scientific writing training was conducted to address the needs of madrasah teachers in improving their academic writing competence. Initial needs assessment showed that most teachers experienced difficulties in structuring their manuscripts, applying appropriate academic language, and managing references effectively. To respond to these challenges, the community service team offered a

targeted solution through a structured training and mentoring program that integrated the use of AI-supported writing tools such as ChatGPT, Grammarly, QuillBot, and Mendeley. This approach is aligned with findings from recent studies showing that AI-based writing assistants significantly support novice writers in developing academic structure, linguistic accuracy, and citation management (Bahari, 2025; Tahir et al., 2025).

The program was implemented over a period of two months (June–July 2025) through a combination of face-to-face and online sessions. The sequence of activities consisted of: (1) a pre-test to evaluate participants' initial writing competence; (2) a two-day face-to-face training workshop; (3) online mentoring via Google Docs and WhatsApp groups; and (4) a post-test and reflective evaluation. The training employed an experiential learning approach, enabling participants to learn through concrete experience, reflection, conceptualization, and active experimentation. This model has been widely recognized as effective for technology-oriented teacher development programs because it positions participants as active learners rather than passive recipients (Kolb & Kolb, 2017).

A total of 30 madrasah teachers participated actively throughout the program. During the workshop sessions, participants received materials on the fundamental concepts of academic writing, techniques for structuring scientific articles, hands-on practice using AI writing tools, and guidelines on ethical and responsible use of AI in academic contexts. The learning environment was highly interactive, with participants engaging in discussions, asking questions, and practicing writing in real time. Observational data indicated that 26 participants (87%) successfully completed a full draft of a scientific article, while the remaining participants continued revising their manuscripts with support from the mentoring team. These outcomes are consistent with prior research demonstrating that AI-supported training can enhance teacher confidence, productivity, and engagement in academic writing (Can, 2025; Qiu, 2025).

### Improvement of Participants' Competence

The results of the program indicate a substantial improvement in the scientific writing competence of madrasah teachers. Based on the comparison between the pre-test and post-test scores, there was an average increase of 37%, demonstrating the effectiveness of the training intervention. The most notable improvement was observed in participants' ability to utilize AI tools to enhance grammatical accuracy and automate reference management—skills that are often challenging for novice academic writers. This finding aligns with previous studies showing that AI-assisted writing tools can significantly improve linguistic accuracy, cohesion, and overall academic writing quality (Azennoud, 2024; Song & Song, 2023).

In addition to the quantitative results, qualitative data from the end-of-program evaluation revealed strong positive responses. A total of 93% of participants reported that the training was highly beneficial and relevant to their professional needs. Teachers expressed increased confidence in writing and began to perceive academic writing not merely as an administrative task but as an essential component of professional growth. This shift in mindset is consistent with findings by Cosby et al. (2023), who emphasize the importance of digital literacy and self-efficacy in empowering teachers to participate in scholarly activities.

Table 1. Comparison of participants' pre-test and post-test scores

| Measured Aspect                          | Pre-Test Average Score | Post-Test Average Score |
|------------------------------------------|------------------------|-------------------------|
| <b>Structure of scientific writing</b>   | 42%                    | 78%                     |
| <b>Use of AI writing applications</b>    | 35%                    | 80%                     |
| <b>Citation and reference management</b> | 45%                    | 82%                     |
| <b>Overall average</b>                   | 40.7%                  | 79.7%                   |

### Discussion

The success of this program demonstrates that the integration of AI as a scaffolding tool in scientific writing training can effectively address key challenges faced by teachers, including difficulty initiating writing, limited time, and insufficient mentoring. AI tools aided participants in generating ideas, improving sentence structure, and producing manuscripts aligned with academic conventions. These findings reinforce the work of Liu et al. (2023), who argue that AI does not replace human writers but rather enhances critical and reflective thinking during the writing process.

From a professionalism perspective, the outcomes of this program support the view of Zhang & Zhang (2024), who asserts that AI literacy constitutes an essential component of teacher professional knowledge in the digital era. Teachers who were previously passive in academic activities became more active in writing, engaging in discussions, and sharing their experiences through digital platforms. Moreover, the establishment of a digital learning group contributed to stronger teacher collaboration, consistent with Rikkerink et al. (2016), who emphasize that digital technologies expand professional networks and foster instructional innovation.

Several enabling factors contributed to the program's success, including high participant motivation,

strong institutional support from the madrasah, and the adoption of hands-on, practice-oriented learning methods. However, several obstacles were identified, such as limited internet connectivity and varying levels of digital literacy among participants. These challenges align with the findings of Mpuangnan (2024), who highlight that infrastructure readiness and sustained mentoring are critical determinants of success in technology-based teacher training programs.

Overall, the program successfully met the key indicators of community service outcomes, namely the enhancement of participants' competence, the production of training outputs (including practical guides and draft scientific articles), and the strengthening of digital literacy-based professional communities. These results support the notion that AI-assisted scientific writing training represents an innovative and applicable strategy for advancing madrasah education and facilitating the transition toward AI-enhanced pedagogical practices.

## CONCLUSION

The AI-assisted scientific writing training for madrasah teachers has proven effective in enhancing participants' professional competence. The program successfully addressed the partners' key problems—namely, the low level of scientific writing proficiency and limited digital literacy among teachers. The comparison between pre-test and post-test results demonstrated an average increase of 37%, particularly in participants' ability to structure academic papers, improve grammatical accuracy, and manage references using AI applications.

The success of this program was supported by several enabling factors, including the high motivation of participants, strong institutional support from the partner madrasah, and the use of an experiential learning-based training method that fostered active engagement. Nevertheless, several obstacles were identified during implementation, such as limited internet connectivity, varying levels of digital literacy among participants, and the need for continued guidance in using advanced AI features. Despite these challenges, the program was implemented effectively and resulted in tangible outputs, including draft scientific articles, an AI writing guide for teachers, and the establishment of a digital learning community for madrasah educators.

## REFERENCES

- Akour, M., & Alenezi, M. (2022). Higher Education Future in the Era of Digital Transformation. *Education Sciences*, 12(11), 784. <https://doi.org/10.3390/educsci12110784>
- Azenoud, A. (2024). Enhancing Writing Accuracy and Complexity through AI-Assisted Tools among Moroccan EFL University Learners. *International Journal of Linguistics and Translation Studies*, 5(4), 211–226. <https://doi.org/10.36892/ijlts.v5i4.529>
- Bahari, A. (2025). Balancing syntactic complexity and clarity: the role of AI in enhancing academic writing proficiency. *Saudi Journal of Language Studies*, 5(4), 271–290. <https://doi.org/10.1108/SJLS-10-2024-0062>
- Can, Y. (2025). Artificial intelligence vs. instructor supported AI: teaching second language writing via “Write&Improve.” *Interactive Learning Environments*, 1–24. <https://doi.org/10.1080/10494820.2025.2519123>
- Cosby, A., Fogarty, E. S., & Manning, J. (2023). Digital Literacy and Digital Self-Efficacy of Australian Technology Teachers. *Education Sciences*, 13(5), 530. <https://doi.org/10.3390/educsci13050530>
- Khalifa, M., & Albadawy, M. (2024). Using artificial intelligence in academic writing and research: An essential productivity tool. *Computer Methods and Programs in Biomedicine Update*, 5, 100145. <https://doi.org/10.1016/j.cmpbup.2024.100145>
- Kim, N. J., & Kim, M. K. (2022). Teacher's Perceptions of Using an Artificial Intelligence-Based Educational Tool for Scientific Writing. *Frontiers in Education*, 7. <https://doi.org/10.3389/feduc.2022.755914>
- Kolb, A. Y., & Kolb, D. A. (2017). Experiential Learning Theory as a Guide for Experiential Educators in Higher Education. *Experiential Learning & Teaching in Higher Education*, 1(1).
- Liu, C., Hou, J., Tu, Y.-F., Wang, Y., & Hwang, G.-J. (2023). Incorporating a reflective thinking promoting mechanism into artificial intelligence-supported English writing environments. *Interactive Learning Environments*, 31(9), 5614–5632. <https://doi.org/10.1080/10494820.2021.2012812>
- McKeown, D., Brindle, M., Harris, K. R., Sandmel, K., Steinbrecher, T. D., Graham, S., Lane, K. L., & Oakes, W. P. (2019). Teachers' Voices: Perceptions of Effective Professional Development and Classwide Implementation of Self-Regulated Strategy Development in Writing. *American Educational Research Journal*, 56(3), 753–791. <https://doi.org/10.3102/0002831218804146>
- Mpuangnan, K. N. (2024). Teacher preparedness and professional development needs for successful



- technology integration in teacher education. *Cogent Education*, 11(1). <https://doi.org/10.1080/2331186X.2024.2408837>
- Qiu, G. (2025). On the Relationship Between Students' Perceived Support, Students' Self-Efficacy, and Affect-Emotions in <scp>AI</scp> -Enhanced Learning Environments. *European Journal of Education*, 60(3). <https://doi.org/10.1111/ejed.70180>
- Rahim, F. R., Kher, D. F., & Harisman, Y. (2023). Professional Competence Enhancement of High School Teachers through Scientific Paper Writing Training. *Lectura : Jurnal Pendidikan*, 14(2), 432–443. <https://doi.org/10.31849/lectura.v14i2.15176>
- Rashid, Md. H., Ye, T., Hui, W., Li, W., & Shunting, W. (2021). Analyse and challenges of teaching writing among the English teachers. *Linguistics and Culture Review*, 6, 199–209. <https://doi.org/10.21744/lingcure.v6nS2.2004>
- Rikkerink, M., Verbeeten, H., Simons, R.-J., & Ritzen, H. (2016). A new model of educational innovation: Exploring the nexus of organizational learning, distributed leadership, and digital technologies. *Journal of Educational Change*, 17(2), 223–249. <https://doi.org/10.1007/s10833-015-9253-5>
- Setyawan, F. G., Dwi Widayani, A. A., & Suardhika, I. N. (2022). Model of Digital Literacy and Organizational Support in Determining Teacher Performance: An Empirical Study. *International Journal of Multidisciplinary Research and Analysis*, 05(11). <https://doi.org/10.47191/ijmra/v5-i11-11>
- Song, C., & Song, Y. (2023). Enhancing academic writing skills and motivation: assessing the efficacy of ChatGPT in AI-assisted language learning for EFL students. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1260843>
- Strobl, C., Ailhaud, E., Benetos, K., Devitt, A., Kruse, O., Proske, A., & Rapp, C. (2019). Digital support for academic writing: A review of technologies and pedagogies. *Computers & Education*, 131, 33–48. <https://doi.org/10.1016/j.compedu.2018.12.005>
- Tahir, M., Jahrir, A. S., Asrifan, A., & Ariatna, A. (2025). Examining the Role of AI-Powered Writing Assistants in Enhancing Critical Thinking In EFL Academic Writing. *Journal of Languages and Language Teaching*, 13(4), 1817–1831. <https://doi.org/10.33394/jollt.v13i4.15077>
- Zhang, J., & Zhang, Z. (2024). <scp>AI</scp> in teacher education: Unlocking new dimensions in teaching support, inclusive learning, and digital literacy. *Journal of Computer Assisted Learning*, 40(4), 1871–1885. <https://doi.org/10.1111/jcal.12988>