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Scientific Article Writing Training for Sidoarjo Physics Senior High School Teacher Working Group: Integration of Scientific Publication in Merdeka Belajar

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Abstract

This Community Service activity aims to improve the skills of senior high school physics teachers in Sidoarjo in understanding the structure, writing techniques, and process of submitting scientific articles to accredited journals. The program was implemented using a Participatory Action Research (PAR) approach, which involved identifying partner needs, planning materials, conducting workshops, providing assistance with article drafting, and evaluating the program. The evaluation was conducted using a Likert-scale questionnaire, participant observation sheets, and brief interviews to measure participants' understanding and involvement. The training results showed an increase in teachers' understanding of the main components of scientific articles and an improvement in their ability to write the introduction and methods sections through guided practice sessions. The majority of participants gave "strongly agree" and "agree" ratings to the usefulness of the training, the quality of the material delivery, and the smooth implementation, with the highest percentage reaching 60%. The lowest score of 28% appeared on items related to the dynamic electricity material. Observations also showed that participants were more confident in drafting manuscripts after receiving direct assistance. Overall, this program was effective in improving teachers' basic scientific literacy and has the potential to be a strategic step in building a culture of sustainable scientific publication within the Physics teacher working group, thereby encouraging the creation of scientific works that meet the standards of national and international journals.

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INTRODUCTION

Professional educators educate, teach knowledge, guide, train, assess, and evaluate students (Safitri, 2019). Teachers must be competent to effectively grasp the information that will be delivered to learners. One essential quality teachers need is a strong understanding of the subject they teach, both the knowledge and the teaching materials for the school curriculum (Marzuki et al., 2019). In addition to teaching, teachers are also

tasked with generating community enthusiasm in active reading activities. Teachers need to refresh and enlighten their skills in applying teaching methods and learning approaches during the teaching and learning process, as well as improve their abilities to support the profession; it is necessary to gain experience in writing (Sukmayadi, 2019).

Writing skills are not among an individual's natural skills but skills that must be trained and learned. In other words, one's skills to express thoughts through writing can be honed and improved through practice. The more often someone does writing exercises, the better their writing skills (Widana et al., 2019). Writing skills are a critical competency for a teacher. Writing skills are often associated with the ability to communicate natural ideas both theoretically and practically (Kellogg, 2008). Low writing skills can also be seen from the rarity of high school teachers participating in national and regional seminars (Khoiro et al., 2022). The experience of writing articles that can be published in national and international media is what teachers want for themselves.

The integration of *Merdeka Belajar* carried out by the Ministry of Education, Culture, Research, and Technology (*Kemendikbudristek*) is expected to enable teachers to improve their skills in writing scientific articles. In *Merdeka Belajar*, teachers can access many independent training courses. On the other hand, many high school teachers are not accustomed to writing scientific articles that are then published in scientific journals (Saputra, 2019; Widana et al., 2019). For this reason, the community service team of the Physics Education Study Program at Surabaya State University fulfilled the wishes and desires of the teachers at the physics senior high school teacher working group in Sidoarjo. Training must be implemented, as the expanding education sector demands that all learning establishments enhance their resources and infrastructure, as well as educators' skills, to ensure high quality (Yohamintin et al., 2021).

Relevant research conducted by Emaliana (2019) entitled “Training in Scientific Writing for English Teachers in Senior High Schools/MA in the Greater Malang Area” resulted in an understanding of the concept of professional development and improved the quality and quantity of development work in the form of English scientific articles, including the process of abstract writing. According to Khoiro (2022), the results showed that implementing scientific article training increased participants' understanding of key aspects of scientific article writing and publication. Meanwhile, a bibliometric study found that physics community services make a significant contribution to improving science literacy and strengthening the physics education ecosystem, making the development of community-based service activities increasingly relevant and necessary (Edelweiss et al., 2024). The increase in teachers' understanding through this training was quite high, as calculated by comparing the percentage of participants' understanding before and after the training. Thus, it received positive responses from all teachers, as evidenced by the high scores on the activity evaluation questionnaire, and can be said to have facilitated improvements in the quality of teachers' writing and publications.

However, the physics senior high school teacher working group in Sidoarjo faced five main obstacles in writing and publishing scientific articles: limited time, low writing skills, lack of knowledge of publication platforms, high publication costs, and minimal institutional support (Deta et al., 2024). These obstacles not only hinder the article writing process but also reduce teachers' motivation to develop scientific works on an ongoing basis. Time constraints and heavy workloads make it challenging for teachers to find time to write, while a lack of understanding of journal writing standards means many article drafts fail to meet scientific publication requirements. The high cost of publication and lack of institutional support, both in terms of facilities and policies, further exacerbate the situation. These conditions suggest that teachers require more structured interventions,

such as training and mentoring programs, to address their genuine needs and overcome the challenges they encounter in scientific writing and publication.

Thus, with research on scientific article writing for teachers, various studies have shown positive results. Setiawan (2023) found that scientific article writing training helps teachers understand the urgency of scientific publication, recognize the structure and mechanism of article writing, and learn the procedures for submitting manuscripts to national and international journals. The actualization of this training is reflected in an increase in teachers' abilities, knowledge, and experience in producing scientific work that aligns more closely with professional standards. In line with this, Setiawan (2024) emphasized that teachers are encouraged to utilize research and learning findings as part of their professional development by preparing scientific articles and participating in training activities. Other findings from Jana & Pamungkas (2018) also indicate that PTK training can enhance teachers' confidence in documenting learning practices, although its coverage remains dominant at the elementary school level. Kasiyan et al. (2019) note that scientific writing training can enhance the quality of teachers' manuscripts, although further assistance with publication is still needed. Research by Maghfira et al., (2022) and Mansyur & Akidah (2018) also confirmed an increase in teachers' writing skills. Still, both emphasized that a lack of experience and understanding of journal writing standards remains a common challenge.

Based on the description above, it can be concluded that teachers who are members of the Sidoarjo physics senior high school teacher working group still faced several obstacles in writing scientific articles, particularly in the stages of article systematics, limited time for writing, and high publication costs. Initial interviews with the Physics teacher working group administrators also revealed specific weaknesses among the partners, namely that most teachers are not accustomed to publishing in accredited journals and still have minimal experience in independently submitting manuscripts. Nevertheless, the partners have strong potential, namely the high enthusiasm among teacher working group members for professional development, the availability of an active learning community, and several teachers who already have experience in classroom action research, which can serve as initial capital to improve scientific publication skills.

Therefore, a solution is needed in the form of scientific article writing training designed to meet the partners' needs, covering the understanding of article structure, publication strategies, and the practice of drafting articles. The objectives of this community service activity are to enhance teachers' writing skills in scientific articles, provide support in the publication process, and foster a culture of scientific literacy within the Sidoarjo physics senior high school teacher working group. Through systematic training and assistance, it is hoped that teachers' skills in writing and publishing scientific articles will continue to develop.

METHODS

The implementation of this Community Service Program is based on the Participatory Action Research (PAR) approach. The PAR approach was chosen because it is widely recognized in social research and community empowerment activities, especially in the context of higher education. The PAR principle, which emphasizes collaboration, active participation, and reflective action, aligns with the three pillars of higher education: education and teaching, research, and community service, thereby enabling the direct involvement of teachers in the entire process of activity (Siswadi & Syaifuddin, 2024). This community service activity was conducted by the community service team of the Physics Education Study Program, FMIPA Unesa, in collaboration with physics senior

high school teacher working group throughout Sidoarjo, serving as partners, and attended by 48 physics teachers from various public and private high schools with diverse teaching experience backgrounds. Participants were selected based on their active membership in the teacher working group and their willingness to participate in the entire training program. Although some teachers already had experience in classroom action research, most lacked the skills and experience in publishing scientific articles in accredited journals, making training in scientific article writing and publication an urgent need for the participants. The stages of the activity are presented in Figure 1.

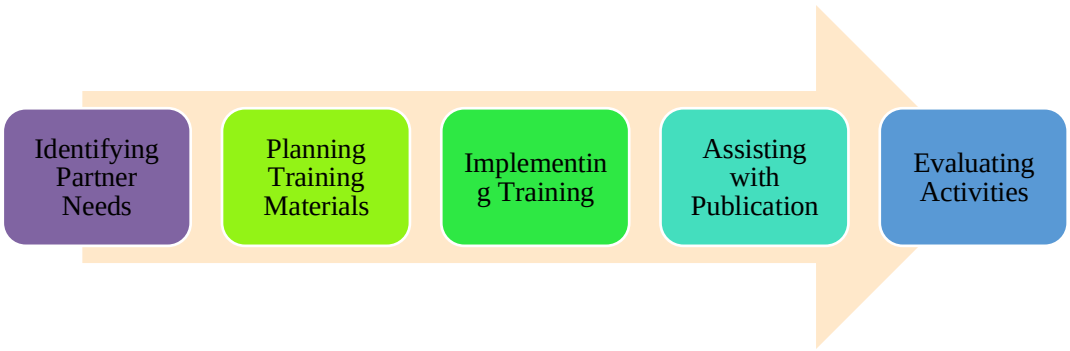

Figure 1 Implementation flowchart

Based on Figure 1, the training activities were carried out in several stages. The initial stage involved discussions with the teacher working group chairperson to identify the problems experienced by physics teachers and the most relevant training needs. From the results of this identification, it was found that teachers still faced difficulties in systematically writing scientific articles, did not fully understand journal publication standards, and encountered publication cost constraints that hindered their ability to produce scientific work. The next stage was planning the training material, which included the systematics of writing scientific articles, reference writing techniques, strategies for selecting journals, and examples of published articles. Following this, the training activities were conducted through interactive lectures, discussions, and practical exercises involving article drafting. In the next stage, participants received further assistance in the form of consultations on their article drafts and recommendations for suitable journals. The entire series of activities concluded with an evaluation to assess the program's effectiveness and the participants' level of understanding.

Several instruments were used to evaluate the success of the training, namely, evaluation questionnaires and observation sheets. Questionnaires were given to all participants at the end of the activity using a four-point Likert scale to assess the usefulness of the training, the clarity of the material delivery, the presenter's mastery of the material, and the relevance of the training to the teachers' needs. Observation sheets were used by the team to monitor participant activity during the training sessions, including the frequency of questions, participation in discussions, and the ability to complete practical tasks. Meanwhile, brief interviews were conducted with several participants to explore the obstacles they encountered, their perceptions of the training, and suggestions for future program development. The questionnaire instrument used in the training evaluation contained the following statements:

1. This training provided many benefits to me.
2. The delivery of the material was communicative.
3. The speaker mastered the training material well.

4. This training gave me an overview of dynamic electricity material based on scientific argumentation skills.
5. Through this training, I got an overview of dynamic electricity material.
6. The training material helped me to understand scientific argumentation skills.
7. Through this training, I was inspired to develop a project to strengthen dynamic electricity materials based on scientific argumentation skills.
8. The implementation of the training went well.
9. If the *Community service* team of the Department of Physics *FMIPA* Unesa perceives another training, I will gladly participate in it.

The data obtained from the questionnaire were analyzed descriptively, using percentages to describe participants' levels of satisfaction and understanding of the training material. Qualitative data from observations and interviews were analyzed using categorization techniques, specifically grouping participants' responses into distinct themes, such as training benefits, writing obstacles, and follow-up needs. The results of the analysis of these three types of data were used to provide a comprehensive picture of the program's effectiveness and as a basis for improving the community service program in its next implementation.

RESULTS AND DISCUSSION

The Community Service activity began with identifying partners' needs through discussions with the head of the Physics teacher working group. This stage provided an initial overview of the difficulties teachers experience when writing scientific articles, enabling the training material to be tailored to the participants' real needs. During the training, teachers demonstrated great enthusiasm for the material presented. This was evident from the numerous questions and discussions that arose during the question-and-answer session, as documented in the photos taken during the presentation of the material, shown in Figure 2. This positive response aligns with the findings of Emaliana (2019) and Khoiro et al., (2022), which suggest that tailoring training materials to the needs of teachers will increase participants' interest and involvement.

Figure 2 Submission of scientific article writing material

Each participant's understanding varies; some require assistance in publishing scientific articles. However, this hurdle is surmountable, thanks to the unique support provided by the Community Service Team, which grants free access to publishing scientific articles in National journals. The participants' overwhelming enthusiasm for the community service activities is a testament to the program's success. The teachers' satisfaction and enthusiasm, quantitatively measured through a questionnaire survey, further validate this.

The results of the questionnaire evaluation of scientific writing training indicate that this community service activity provides many benefits to members of the physics senior high school teacher working group in Sidoarjo. In addition, the material delivered by the

Physics Education Study Program community service team was communicative. High ratings were given for the response that this training provided many benefits, the presenters mastered the material well, and the training went well. This received an excellent response, with a percentage strongly agreeing of 60%. The lowest assessment occurred in the assessment indicator, an overview of dynamic electricity, with a rate of strongly agreeing at 28%. Scientific article writing training runs smoothly; this is also supported by the number of participants/teachers who have authored and even published scientific articles in journals. The results of the scientific article writing training evaluation are shown in Figure 3.

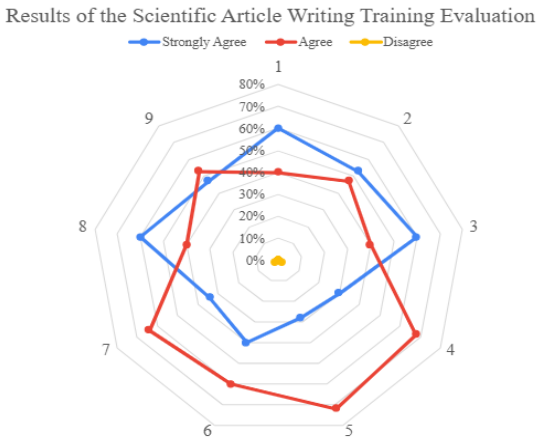

Figure 3 Evaluation result of scientific article writing training

Based on Figure 3, the evaluation results of the scientific article writing training conducted were positive, as indicated by the questionnaire. The response pattern on the radar chart is different. The value of the agreed response is higher than the strongly agreed or disagreed response. The resulting radar graph pattern shows a clear difference among the three responses, with the agreed response section being more comprehensive for the fourth, fifth, sixth, seventh, and ninth question items. In contrast, the strongly agreed response is only prominent or broader in the first, second, third, and eighth question items. Only a tiny area is seen in the disagree response because only about 0.4% of reactions exist.

Emaliana's (2019) research revealed that teacher working group members faced challenges in generating ideas for popular scientific articles. Research conducted by Khoiro (2022) increased teachers' understanding through training, as measured by comparing the percentage of participants' understanding before and after the training. Thus, it facilitates the improvement of the quality of writers' and teachers' publications. Then, in the article-writing training conducted by Munasir (2020), the teacher's response to the difficulty of writing articles was relatively high. Meanwhile, the training undertaken by the community service team of the Physics Education Study Program has received a response indicating that the activity is not useful, which is deficient. So, almost all training participants benefit from the community service team's training in the Physics Education Study Program.

The training conducted by Ngara (2024) was carried out in Kupang. It was a training for high school / vocational and junior high school teachers. This training is not much different from that conducted by the community service team of the Physics Education Study Program at FMIPA Unesa, which uses the lecture-question-and-answer method.

Still, the difference is that the community service team of the Physics Education Study Program, FMIPA Unesa, distributes questionnaires that participants must complete to provide feedback, which can be used as a benchmark for how useful the training was. In addition, the community service team's training in the Physics Education study program integrates *Merdeka Belajar*.

According to Setiawan's (2024) research, teachers benefit from the scientific article-writing training program that was carried out. This training enables teachers to produce more high-quality articles. This is supported by the results of the community service Team of the Physics Education Study Program FMIPA Unesa, which suggests that training in writing scientific articles can benefit teachers and motivate them to be more active in improving their writing skills. In addition, the results of research by Sukmayadi (2019) resulted in scientific articles published at scientific meetings and scientific journals; this was also done by the community service Team of the Physics Education Study Program, FMIPA Unesa, by accommodating publication services to support the improvement of scientific publications for teachers in independent learning.

In line with Marlena's research (2017), the training in writing scientific articles that has been provided by the community service Team of the Physics Education Study Program *FMIPA* Unesa has resulted in a very satisfying response to the training that has been provided, primarily related to the conditions of facilities and infrastructure in the training, mastery of the material by the presenting team, providing opportunities to ask questions, relevance of research material systematic delivery of training material. According to research conducted by Latuconsina (2023), the benefits of this scientific article writing training include building confidence in writing scientific articles, developing self-efficacy in scientific publications, and capturing writing opportunities in both national and international journals. According to Mujiwati (2017), scientific article writing training activities for teachers show that the material presented aligns with the systematics of writing and citation; the assistance in preparing class action research produces insights into compiling research activities.

With this training, members of the physics senior high school teacher working group not only gain knowledge and experience related to scientific articles but also receive a free publication service for teachers interested in publishing their scientific articles in national and international journals.

CONCLUSION

The implementation of this community service has successfully achieved its objectives: enhancing the ability of the physics senior high school teacher working group to understand the structure of scientific article writing, practice manuscript preparation, and receive guidance on the publication process. The evaluation questionnaire results showed a high level of agreement on all questionnaire items, confirming that each stage of the training, from material delivery and hands-on practice to publication guidance, contributed positively to improving participants' understanding and motivation. These findings also emphasize the importance of integrating scientific writing and publication training into teachers' independent learning activities to foster a culture of scientific literacy and promote continuous professional development. In the future, similar programs need to be supplemented with intensive guidance up to the article submission stage, the provision of regular writing clinics in the teacher working group environment, and the development of self-learning modules based on scientific literacy, so that this training not only provides short-term benefits but also strengthens teachers' long-term competence in producing quality scientific work.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS STATEMENT

Utama Alan Deta: Conceptualization, Methodology, and Validation; Alfi Nurlailiyah: Methodology, Formal Analysis, and Resources; Mozza Pinkan Edelweiss: Writing - Original Draft, Writing - Review & Editing, and Visualization; Heny Aryani: Writing - Original Draft, Writing - Review & Editing, and Visualization; Ananda Dwi Pratiwi: Writing - Original Draft, Writing - Review & Editing, and Visualization; Setyo Admoko: Supervision, Project Administration, and Funding Acquisition; Habibi: Supervision, Project Administration, and Funding Acquisition; Nadi Suprapto; Supervision and Project Administration; and Suliyanah: Supervision and Project Administration.

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