



Empowering High School Students in Nganjuk Through Scientific Writing Training: A Community Engagement Initiative

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ABSTRACT

This community service activity was specifically aimed at high school students in Nganjuk, who generally need to improve their knowledge and skills in writing scientific articles. The objectives of this activity are to (1) provide knowledge and understanding of the methods for writing scientific works, particularly national journal articles, and (2) assist students in producing scientific papers. The training began with explanations accompanied by examples (including titles, background, methods, results, discussions, conclusions, implications, and references). Participants were then assigned writing exercises on topics of their interest to work on at home. After five days, they reconvened to present their written results. In general, the training resulted in improved knowledge and skills, as participants demonstrated increased understanding and ability in writing scientific papers compared to before the training. This improvement was reflected in the rise in average scores and the outcomes of interviews conducted after the training process.

INTRODUCTION

Scientific writing is a critical skill for students in today's academic and professional environments. It enables learners to communicate their ideas effectively, articulate research findings, and contribute to the advancement of knowledge in various fields. Despite its importance, many high school students, particularly in regions such as Nganjuk, often lack adequate exposure to scientific writing practices. This limitation hampers their ability to participate in academic competitions and showcase their innovative ideas.

Recognizing the need to address this gap, this community engagement initiative was designed to empower high school students in Nganjuk through a structured scientific writing training program. The program aims to equip students with the fundamental skills of writing, analyzing, and presenting scientific work, enabling them to develop high-quality research papers that can compete at local, national, and even international levels.

To make the training relevant and impactful, the program focuses on utilizing Nganjuk's rich local resources as themes for scientific exploration. Students are encouraged to identify potential research topics related to locally abundant raw materials, such as roses, shallots, and cloves—iconic products of Nganjuk that hold both cultural and economic significance. These materials provide a unique opportunity for students to integrate their scientific creativity with local wisdom, resulting in research projects that are not only academically robust but also regionally meaningful.

This initiative also aligns with broader educational goals, such as fostering critical thinking, enhancing problem-solving skills, and promoting sustainable innovation. By engaging students in the process of scientific inquiry, the program aims to nurture a generation of young researchers who are capable of addressing real-world challenges while highlighting the potential of their local environment.



This article explores the design, implementation, and outcomes of the scientific writing training program. It highlights the transformation of students' writing skills, their growing confidence in participating in scientific competitions, and the role of community engagement in bridging educational gaps. Ultimately, this initiative demonstrates the power of education in unlocking the potential of young minds and fostering sustainable community development.

METHOD

The training employs various methods, including lectures, question-and-answer sessions, discussions, hands-on training, and presentations. This training is highly beneficial for participants in developing competencies required to produce high-quality scientific writing. Students gain knowledge and a broader understanding of how to write scientific works effectively. Specifically, the implementation of the methods is carried out as follows:

a. Identification and Formulation of Problems

Based on situational analysis, theoretical foundations, and real-world observations, the following problems have been identified:

1. Many high school students in Nganjuk still face difficulties in writing scientific papers.
2. Many high school students in Nganjuk lack adequate information on the proper methods for writing scientific papers.
3. Many high school students in Nganjuk are unaware of how to publish their scientific papers in reputable national and international journals.
4. Writing scientific papers requires adherence to proper scientific methods to prevent plagiarism, fabrication, and other unethical behaviors. Therefore, a specialized training activity is needed.

b. Framework for Problem-Solving

Writing scientific papers requires the application of proper scientific methods to avoid issues such as plagiarism, fabrication, and ethical violations. To address this need, it is essential to conduct specialized training for students on how to produce scientific papers that can be published in academic journals. Additionally, the training includes raising awareness about journals that could serve as publication targets and how to submit papers to those journals.

This training incorporates participatory evaluation during its implementation. The evaluation criteria, indicators, and measurement benchmarks include mastery of the training material, active participation, and the ability to produce high-quality scientific articles for journals. The evaluation is conducted in three stages:

1. Initial Evaluation: A pre-test is administered to assess participants' baseline understanding and skills.
2. Process Evaluation: Observational assessments are carried out to gauge participants' engagement and commitment during the training.
3. Final Evaluation: A post-test is conducted to evaluate the training outcomes, including participants' level of understanding and their improvement in scientific writing skills.

To address time constraints, participants are provided with sample articles, writing manuals from specific journals, and templates as guidelines to reduce confusion in writing. To further enhance their knowledge, participants are required to present their



draft articles on the final day of the training. The resource persons then provide feedback on their drafts.

RESULT AND DISCUSSION

In total, there were 21 high school students from several high schools around the Nganjuk Regency Education Office who participated in the KIR activity (PKM) organized by the PKM RBK Physics Material Study Program Team, FMIPA, Surabaya State University at SMAN 1 Nganjuk. The PKM activity was held on Saturday, July 20, 2024. The KIR activity was entitled: " Developing Scientific Creativity: Scientific Writing Training for Teachers and Students of the Nganjuk Physics MGMP by Utilizing Local Natural Resources (Rose Flowers) ". The six questionnaire questions in question along with detailed student responses are given in Table 1 below.

Tabel 1. Questions in the PKM questionnaire and details of the responses/answers of the 21 students participating in the PKM activity to the questions.

No.	Question Items	Student Response
1	Is the Scientific Writing Training activity for teachers and students of the Nganjuk Physics MGMP using local resources (roses) interesting and useful ?	- It is very interesting and useful because it makes us aware that the surrounding environment has many materials to be used as KIR. - Interesting, adds new knowledge, and the explanations are fun. - Interesting and useful because we can gain new knowledge and diverse knowledge from the material presented. - Interesting and useful because it provides information that I did not understand before. - It's very interesting because this is a new innovation that I've just seen. - Interesting and useful because we can learn about the various benefits and how to process it, and it can generate new ideas. - Interesting and useful because I now know more about how to process roses. - Interesting and useful because it brings up new ideas that are very useful. - Interesting and useful because it can motivate us to find new ideas, and know the process of making them. - Interesting and useful because it provides the latest information and interesting presentation of the material.



No.	Question Items	Student Response
		- Interesting because I learned that the use of roses can be more varied and innovative. - Interesting and useful because the explanation is easy to understand, and what is explained is something new. - Interesting and useful because it is very useful for the future for those who want to know about the uses of roses. - Interesting because it is delivered in an interesting and not boring way. Very useful because I can know that roses can be made into perfume. - Interesting and useful because with this activity we can know that roses can be used to make perfume, skincare so it is very interesting and not boring. - Interesting and useful because it utilizes existing organic materials so that organic waste is not wasted. - Interesting and useful because it can inspire me to try new things and learn about organic materials. - Interesting and useful because with this training I learned how to write KIR correctly and utilize local sources. - It is very interesting because with this genius potential it will produce several products. - It is increasing and beneficial because with the KIR training by utilizing local rose flower resources, it provides a lot of knowledge and insight that is very useful for the future. - Interesting and useful because I can get new knowledge that I didn't know before.
2	Are the explanations given and the video demonstration of rose flower extraction as aromatherapy shown by the Implementation Team for this activity coherent, easy to	- It is coherent and easy to understand because when explaining it, it is accompanied by examples that can be imagined in everyday life. - Easy to understand, very easy because it shows directly how to



No.	Question Items	Student Response
	understand and easy to imitate later ?	make it and can be imitated because the ingredients are quite easy. - Coherent, easy to understand and imitate because it presents simple videos that are easy to understand because they are accompanied by explanations that are easy to convey. - Coherent, easy to understand and imitate because the video presented is quite simple by providing a clear picture so that it is easy to understand. - Easy to understand because the videos are fun. - Coherent and understandable with such detailed explanation. - Coherent, easy to understand and imitate because it is explained in detail by the speaker. - It is coherent because it is explained in detail until we understand. - It is coherent, easy to understand and imitate because it is made clearly and simply so that we can understand it. - Coherent, easy to understand and imitate because the steps in the video are easy to understand. - Sequential, Before the demonstration video is shown, the extraction method is explained sequentially so that it is easy to understand (both conventional/maceration). - Coherent, easy to understand and imitate because simple examples are given. - Coherent, easy to understand and imitate because it can be exemplified. - Coherent, easy to understand and imitate because the delivery is very simple. - Coherent, easy to understand because I think the explanation given is very simple. - Coherent, easy to understand because the UNESA Team (lecturers) have explained in great detail. - Coherent, easy to understand and imitate because the Team's delivery is very coherent and not complicated.



No.	Question Items	Student Response
		- It is coherent, easy to understand and imitate because the lecturers explain it in great detail and are easy to understand. - It is coherent and easy to understand because the way of explaining it is so fun and not boring. - It is coherent and easy to understand because the way the lecturer explained it was very clear so that I did not feel any confusion. - It is coherent, easy to understand and imitate because examples of how to make it, such as aromatherapy, are provided.
3	After participating in this training activity, do you want to try to utilize it? natural resources that exist in the local residential/school environment to be made into something new and useful for the community (for example, roses as aromatherapy)?	- Yes, I am currently also participating in a research competition. With this training, my knowledge has increased. - Want to try out the research, or rather prove it. - Yes, I want to try it because the innovations resulting from research and then poured into KIR can be beneficial for many people. - Yes, I want to try it because the training increased my curiosity by showing me some useful commodities. - Yes, I would like to try it because it is easy to imitate and useful. - I want to try it because it is very interesting. - Yes, I want to try it because I think it is very interesting to try. - Yes, I want to try it because it is a challenge for me. - Yes, I would like to try it because the ingredients are easy to find, and it could be a useful product to utilize. - Yes, I would like to try it because the activity is quite easy to understand and do. - Yes, I want to try it because I want to create and produce new products that can solve individual/general public problems. - Yes, I want to try it because who knows, maybe the results of utilizing



No.	Question Items	Student Response
		natural resources can be sold so there is no waste. - Y, I want to try it because I want to know what roses can be made into. - Yes, I want to try it because I have never tried it before and it is very interesting. - Yes, I want to try it because I have never tried it before. So after this activity, I feel interested in trying it. - Yes, I want to try it because it will increase my knowledge and also for competitions. - Yes I want to try it because many people don't know about it and I want to take advantage of it. - Yes, I want to try it because it turns out that just using roses can be many things. - Yes, I want to try it because it is not only beneficial for the environment, but also beneficial for human survival. - Yes, I want to try it because I think it is very interesting so I want to try to utilize the natural resources in my environment so that they can be introduced to local residents. - Yes I want to try it, it looks simple and easy to try at home.
4	If given the opportunity, would you like to participate in the scientific writing activity using the results obtained in point No. 3 above?	- Yes, currently I am following KTI research, so I will develop it further. - Certainly to increase creativity and personal innovation. - Yes, I want to join because besides being beneficial for others, I can also explore and develop my abilities. - Yes, I want to participate because there are many commodities in my environment that have not been optimally utilized. - Yes, I want to follow to increase my innovation and knowledge. - Yes, I want to join because it is very interesting, and I really want to be able to write scientific papers. - Yes, I want to join to increase my experience and knowledge.



No.	Question Items	Student Response
		- Yes, I want to join because I want to develop extra KIR in my school so that it will be more advanced and many people will be interested. - Yes, I want to join because I am interested, and can find new ideas. - Yes, I want to participate in the KIR activity because I want to learn more about how to write an interesting KIR that is in accordance with linguistic rules. - Yes, I want to try it because I want to show the research results of the activities that have been carried out (both to increase effectiveness for the public/further researchers). - Yes, I want to take part in the KIR competition held at the university so that the certificate can be a supporter in the SNBP. - Yes, I have a desire to participate in KIR activities because I want to gain experience and get a certificate to continue to college. - Yes, I want to participate in the KIR activity because it is interesting and by participating in the KIR activity, I gain new knowledge. - Yes, I have a desire to participate in KIR activities because I am interested, and with this activity I can gain new experiences, new knowledge that I did not know before. - Yes, I want to try it because writing scientific papers can increase insight and knowledge. - Yes, I want to join because we can gain new knowledge. - Yes, I want to join because I want to increase my knowledge because by making KIR we have to do research. - Yes, I have a desire to participate in KIR because by producing this work we can help the agricultural sector and the economy in society. - Yes, I have a desire to join because I want to increase my insight and try to develop the ideas that I have.



No.	Question Items	Student Response
		- Yes, I want to join KIR so that I can gain new knowledge.
5	Did this training activity run effectively ? And during this training activity, were there any shortcomings that needed to be fixed? If there are still shortcomings, please mention them.	- This activity has been running effectively as seen by all participants paying close attention. - Yes, it is effective because the questions and explanations are answered and easy to understand. - Yes, it is effective because every question that is still confusing can be answered easily, and the explanation given is very detailed but not confusing. - Yes, it is effective because the material presented is consistent with the theme and easy to understand. - Yes, it is effective because the language used is easy to understand and the explanation is very exciting. - Yes it is effective because it is very enjoyable and the explanation is very detailed. - Not yet effective because the hours are a little less in line with the schedule. - Yes, it is effective because it is very fun and not boring, we can understand clearly. - Yes, it is effective because it is easy to understand and can motivate us to do what has been explained. - Not yet effective because the required video should contain perfect and complete stages. - Yes, it is effective because it opens our insight into the field of Physics, as well as tips and ways to make KIR. - Not yet effective, maybe the writing on the ppt slide should be enlarged . - Yes, it is effective because the information conveyed is very easy to understand. - Yes, it is effective because I gain knowledge easily, and I understand the lecturers who explain it. - Yes, it is effective because I can understand the information provided by UNESA easily.



No.	Question Items	Student Response
		- Yes, it is effective because the team from UNESA (lecturers) have explained in detail and with excitement.😊 - Yes, it is effective because it can trigger the spirit to start new and effective innovations. - Yes, it is effective because the lecturers are very easy to explain and enjoyable. - Not yet effective due to time delay, otherwise very good. - Yes, it is effective because the material explained by the lecturer is very complete and easy to understand. - Yes, it is effective because I think some (almost all) of the explanations are acceptable to me.
6	What suggestions/hopes do you have for the Implementation Team? PKM in carrying out service activities in the future, both here and in other places?	- My suggestion & hope is there, for example, it can be taken from the research of lecturers who have conducted research. - My suggestion is to show trending research to make it more exciting and hopefully you can come here again.😊 - I hope that another meeting can be held to discuss the material further.😊 - My suggestion is that this activity can reach more people so that people's knowledge can increase, besides the material, I hope this activity invites people to practice. - I hope that there will be another school tour around Nganjuk. - My hope is that this activity will be held again with direct practice because it can generate new ideas. - My suggestion is that the activity time is in accordance with the schedule that has been set. Thank you for the knowledge.😊 - I hope it will be held again because it is very useful and brings up new ideas. - My hope is that I can become a golden generation by utilizing materials that are around me and are useful for everyone so that I can advance the nation and state.



No.	Question Items	Student Response
		- My suggestion, maybe it would be better if examples of the results were given or brought. - My suggestion, before implementing PKM, should provide a sample per stage of research that can be used as an example for PKM (can be from research by trusted students/lecturers). - Suggestion, conduct an experiment. - My suggestion, do an experiment. - My suggestion is to make the delivery more enjoyable. - I hope that this activity can be useful and very beneficial for me in the future. - I hope to be able to participate in this PKM RBK on this occasion, and I hope to be more enthusiastic in participating in the competition. - I hope there will be more knowledge about Physics. - I hope Tim can explain more because it was so much fun. - I hope that in the future we can produce more products that are useful to the community. - My hope is that lecturers can provide broader knowledge to people who need more knowledge so that it will be very useful for them. - My hope is that I can follow PKM and increase my insight to develop. My suggestion, when explaining something do not cut/interrupt.

Based on the recap of the responses/answers from the students above, as well as the suggestions that have been given, the results of this PKM activity can be summarized in Figure 1. As seen in Figure 1, it can be concluded that this PKM (KIR) activity has a positive impact, namely it has been able to attract the interest & motivation of all student participants in the activity to utilize the natural resources (local) around them as a source of inspiration to do something new, which has not been done by others. Armed with practice on these natural resources, the participants were also very enthusiastic about participating in the KIR activity. They also really hope that the PKM activity by Mr./Mrs. Physics Lecturer FMIPA UNESA can be continued in the future so that their adventures can continue.

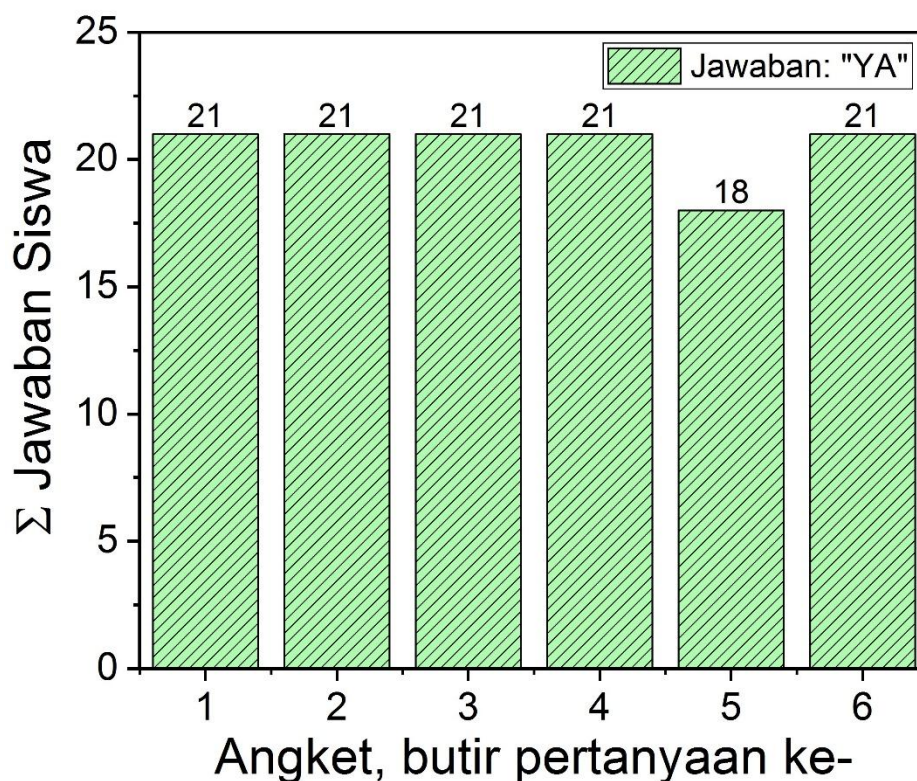


Figure 1. Responses of 21 high school students around the Nganjuk Regency Education Office as participants in the KIR (PKM) activity to questions 1, 2, 3, 4, 5 and 6 of the questionnaire as mentioned above.

CONCLUSION

Based on the implementation process, which included the delivery of training materials, group discussions, pre-tests, and post-tests, the following conclusions can be drawn: In general, there was a significant improvement in participants' knowledge of scientific writing compared to their previous understanding, as reflected by the increase in average scores after completing the training process. The assessment of students' scientific writing skills in high schools in Nganjuk is crucial and strategic, as it greatly influences students' motivation to carry out their tasks and roles. Therefore, follow-up actions in the form of workshops for all students are necessary to ensure the realization of effective schools and to encourage high school students in Nganjuk to continuously learn and better prepare themselves, particularly in developing their competence in writing scientific papers.

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