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Training on Making Natural Disaster Sensor Teaching Aids as an Implementation SDGs in the Merdeka Curriculum for Teachers at Bandarlampung

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Abstrak

Bencana alam merupakan ancaman serius bagi kehidupan dan ekosistem lingkungan. Pendidikan memiliki peran penting dalam memperkenalkan konsep-konsep yang mendukung pencapaian Tujuan Pembangunan Berkelanjutan (SDGs) ke dalam kurikulum. Namun, berbagai tantangan yang dihadapi oleh guru fisika di Kota Bandar Lampung terutama berkaitan dengan pemahaman konsep SDGs serta keterbatasan alat peraga pembelajaran yang mendukung proses belajar. Oleh karena itu, kegiatan ini bertujuan untuk memberikan pelatihan kepada guru fisika di Kota Bandar Lampung dalam pembuatan dan penggunaan alat peraga sensor bencana alam. Pelatihan ini menggunakan metode IPA (informative–participative–applicative) yang meliputi pretest dan posttest, ceramah, diskusi, lokakarya, serta presentasi. Luaran yang diharapkan dari kegiatan ini adalah artikel yang dipublikasikan pada jurnal pengabdian kepada masyarakat terindeks SINTA 4 serta Hak Kekayaan Intelektual (HKI) berupa alat peraga sensor bencana alam untuk topik perubahan iklim dan pemanasan global. Hasil pelatihan menunjukkan adanya peningkatan pemahaman dan keterampilan guru dalam merancang alat peraga sensor bencana alam dengan memanfaatkan limbah elektronik. Pelatihan ini diharapkan dapat menjadi model pengembangan Keprofesian Berkelanjutan (PKB) bagi guru fisika di Kota Bandar Lampung.

Kata Kunci: alat peraga pembelajaran; pemanasan global; perubahan iklim; SDGs

Abstract

Natural disasters are serious threat to life and the environmental ecosystem. Education has an important role in introducing concepts to achieve SDGs in curriculum. However, various challenges faced by physics teachers in Bandarlampung are mainly related to the concept of SDGs and the lack of teaching aids that support learning. Therefore, this activity aims to provide training to physics teachers in Bandarlampung to making and using natural disaster sensor teaching aids. This training uses the IPA (informative-participative-applicative) method including pretest posttests, lectures, discussions, workshops, and presentations. The expected output of this study is an article that will be published in the sinta-4 indexed community service journal, intellectual property rights form of natural disaster sensor teaching aids for the topics of climate change and global warming. The results of the training showed increase teachers' understanding and skills in designing natural disaster sensor teaching aids by utilizing electronic waste. This training become a model for the Development of Continuous Professionalism Improvement of Physics Teachers in the City of Bandar Lampung.

Keywords*: climate change; global warming; sdgs; teaching aids*

INTRODUCTION

Natural disasters are natural phenomena that can periodically threaten human life and cause damage to the environmental ecosystem (Nasrullah et al., 2021; (Hofisah et al., 2022). From floods to earthquakes, natural disasters have become a serious threat to the survival and well-being of humans around the world. In facing these challenges, the global community has adopted the Sustainable Development Goals (SDGs) as a framework to promote socially, economically, and

environmentally sustainable development (Humaida et al., 2020). The importance of the SDGs in the context of education is especially reflected in the Merdeka Curriculum.

The Merdeka Curriculum aims to provide opportunities for students to develop a deep understanding of global and local issues and to hone relevant skills to face future challenges (Widiastari & Yuliandewi, 2022). By emphasizing learning based on local needs, the merdeka Curriculum provides opportunities for students to explore the real context around them (Hasmiati et al., 2024), including the impacts and responses to natural disasters. Through this approach, it is hoped that students will become more empowered and insightful agents of change in fighting for sustainable development goals (Prabowo et al., 2024). Based on the interview results, Physics teachers often face challenges in implementing SDGs concepts in the classroom.

One of the main challenges is the lack of teaching aids that support learning about SDGs issues. This is especially evident in the context of teaching concepts such as climate change and global warming. These materials require a more practical and applied approach to facilitate deep understanding. The lack of appropriate teaching aids hampers teachers' ability to deliver the material effectively, reducing the appeal and effectiveness of learning for students. The focus of this study was on the use of disaster sensory teaching aids in the context of climate change and global warming.

The results of the study showed that the use of disaster sensory teaching aids significantly improved computational thinking skills and the ability to solve problems creatively.

Thus, this study confirms the importance of using disaster sensory teaching aids in supporting the learning of SDGs concepts in the classroom, especially in the context of physics and other sciences. Therefore, through this community service, we aim to provide training to physics teachers in Bandarlampung in the creation and use of disaster sensory teaching aids. Our hope is that these teachers can improve their skills in teaching disaster issues and SDGs to their students. We also hope that this training will inspire students to become agents of change who care about the environment and sustainability, and help realize sustainable development goals locally and globally.

Thus, this training is expected to provide a positive impact on the Bandarlampung community and a significant contribution to achieving the SDGs as a whole.

METHOD

The method used in this activity is informative, participatory-applicative. The stages of implementing this activity include preparation, implementation, and evaluation, as depicted in Figure 1.

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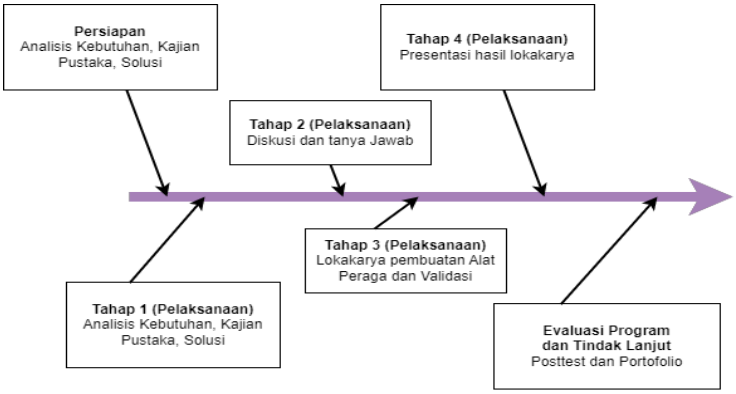

Figure 1. Stages of Activity Implementation

1. Preparation

At this stage, the research team conducts a needs analysis, literature review, and alternative solution design for the problems faced by the partners.

2. Implementation

The implementation stage begins with a pretest to measure the partners' initial knowledge, which is then continued with the provision of material on the urgency and how to create SDG-based learning. In addition, training is provided on how to use physics teaching aids on the topic of climate change and global warming that has been developed by the Activity Implementation Team. The next stage is a workshop on making simple diffraction teaching aids Merdekaly, validating teaching aids, and presenting the developed teaching aids.

3. Program Evaluation and Follow-up

a. Description of research results to be disseminated

Simple teaching aids developed can be used to help students deepen their understanding of climate change and global warming, especially about reducing the impact of natural disasters that occur.

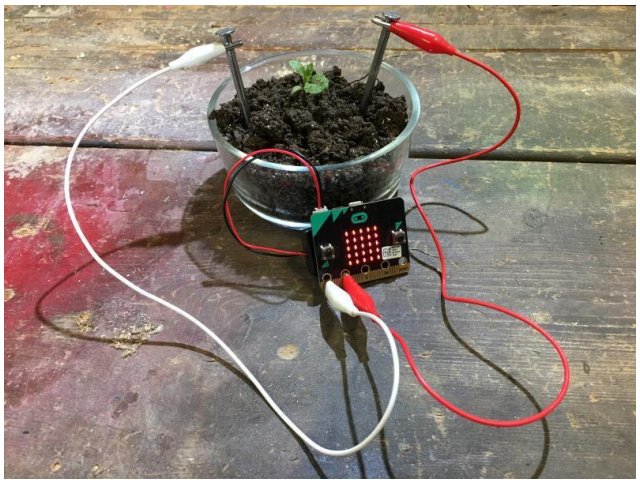

Figure 2. Soil drought sensor demonstration tool as one of the natural disasters due to climate change and global warming

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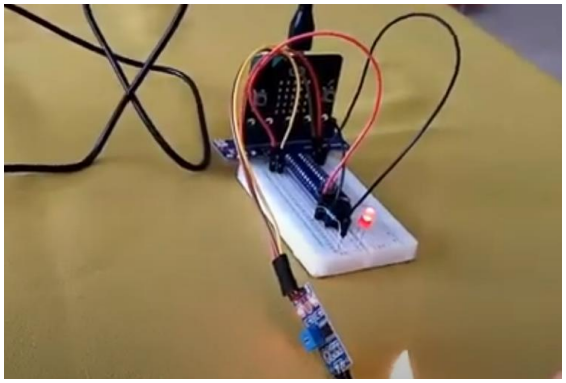

Figure 3. Forest fire sensor demonstration tool as one of the natural disasters due to climate change and global warming

The developed teaching aids have been declared valid and in accordance with the physics concept after being tested by experts. The results of the development of these teaching aids can also be associated with the concept of climate change and global warming.

B. Work procedures

The procedures in implementing this activity include:

1. Pretest

This preset is conducted at the beginning to determine the level of teacher understanding regarding teaching aids and their development. The pretest questions are in the form of a written test.

2. Lecture and discussion

Lecture and discussion on how to provide content on the topic of climate change and global warming in learning and teaching aids and reinforcement of the importance for teachers to have skills in creating teaching aids as media. At the next meeting, the activity implementation team provides training in making teaching aids to teach climate change and global warming.

3. Workshop and Merdeka activities

The next stage after the research team provides the material, teachers make teaching aids Merdekaly in their respective schools which are then tested for validity.

4. Presentation

At the next meeting, each group presents the results that have been developed.

5. Posttest

The posttest is conducted at the end of the meeting with partners, aiming to measure the achievement of the objectives planned for this activity.

RESULTS AND DISCUSSION

Results

This community service activity was carried out on Tuesday, August 13, 2024 and ended on August 27, 2024. The training activity was to make and use teaching aids from electronic waste as an application of SDGs in the Merdeka Curriculum for physics teachers in the city of Bandarlampung.

Implementation of community service two sessions were held, that's in-service training on Tuesday, August 13th, 2024 in the SMA N 2 Bandarlampung Meeting Room and on-service training on Thursday, August 27th, 2024. Before the community service activity was held, our community service team sent invitations to physics teachers in Bandarlampung to be able to send participants who are science or physics teachers through the MGMP physics of Bandar Lampung City, with the topic of making and using teaching

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aids from electronic waste as an implementation of SDGs in the Merdeka Curriculum.

Registration of participants was carried out via Google Form to make it easier for teachers to register for this community service activity. After the number of participants met the quota, the form was closed. The activity was carried out with a total of 31 physics and science teachers. This activity has been designed in the form of a proposal in March to the Faculty Grant and has been approved in May 2023, to hopefully help this activity run smoothly and well.

After that, the community service team designed the planning of this activity in such a way that this activity can be carried out well and run smoothly, so that the objectives of this community service activity can be achieved optimally.

The planning design began with conducting an assessment based on an analysis of needs in the field. Based on the results of the analysis and identification of problems, we prepared the design of this community service activity. Community service activities or more precisely the target are science or physics teachers in Bandarlampung which began with the opening by Prof. Dr. Abdurrahman, M. Si. as a representative of the community.

Figure 5. Welcoming and Motivation at the training event

After the opening of the community service activity, training participants were asked to work on pretest questions to determine the initial abilities of each training participant. The pretest questions were in the form of questions on participants' knowledge of STEAM, SDGs and knowledge in developing teaching aids.

The pretest was given in the form of a google form to make it more efficient and practical. Teachers are also accustomed to using google forms so that there are no problems in the pretest process. This pretest activity was attended by 31 participants.

The results of this pretest will later be used as a reference in delivering the material, so that material that has not been mastered by the training participants can be understood well, while material that has been mastered will be understood more deeply.

Based on these problems, workshop participants were asked to formulate problems, formulate hypotheses, and design worksheets by selecting learning models that are in

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accordance with the context of the problem.

After the pretest was held, the next step was the delivery of material by the resource person who was a team from this community service. In general, the material was delivered using lecture methods, questions and answers, discussions, and exercises or practices. During the training, the participants were very enthusiastic. This is evident from the many questions asked by workshop participants. All presentation of the material is given practice or design or implementation of what practices are possible in on-service training.

Figure 6. Presenting Material by Prof. Dr. Abdurrahman, M.Si about STEM ESD-for SDGs.

Figure 6. shows the first presentation of material presented by Prof. Dr. Abdurrahman, M.Si. which began with a lecture or brief theory about STEM-ESD for SDGs and continued with evaluating the learning that had been carried out or carried out by the participants.

With his extensive experience in the field of Education for Sustainable Development (ESD), Prof. Abdurrahman, M.Si., opened the In-Service Training session with an in-depth presentation.

He explained the importance of integrating ESD into learning to equip students with the knowledge, skills, and values needed to face global challenges. Through his inspiring presentation,

He encouraged teachers to become agents of change in creating a generation that cares about the environment and sustainable development.

Figure 7. Presentation of material by DR. Kartini Herlina, M.Si. about PJBL-STEM

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Figure 7. displays the second presentation of material on PjBL STEM by Dr. Kartini Herlina, M.Si. A brief theoretical presentation of PjBL and its application in STEM learning. She emphasized that this learning must be intended to open the insights of science and physics teachers that the topic of global warming is an interesting topic and must be accepted by students as meaningful learning. Realizing the importance of understanding SDGs from an early age, for sustainable development in the future.

Figure 8. Presentation of material by Mrs. Anggreini, S.Pd., M.Pd. about STEM ESD Teaching Materials

Figure 8. displays the presentation of material by Mrs. Anggreini, S.Pd. M.Pd by providing practical guidance on developing teaching materials that support STEM ESD learning.

She shares tips and strategies for creating interesting, interactive, and appropriate teaching materials to meet students' needs. Through real examples, she inspires teachers to develop quality and effective teaching materials to support meaningful learning.

In this community service activity, teachers were given several alternatives in developing teaching aids that support the learning process that teachers can possibly implement for students by utilizing waste around them. Because from the needs analysis, it is known that teachers still have difficulty in getting ideas for making concept teaching aids by utilizing surrounding materials. In addition, in teaching concepts in class, teachers tend to teach concepts based on available textbooks and have not included topics that are relevant to achieving the SDGs. So the team reviewed and re-informed teachers about this. The success of this activity is not only assessed from the results of the written test (pretest and post-test) but also from the process that occurs during the training. Based on the results of the community service team's observations of participants during the workshop, the following information was obtained.

1. Participants were very enthusiastic and active when participating in the learning simulation given by one of the presenters.

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2. Participants actively asked questions related to problem-based learning and the design of student worksheets.
3. The participants' attention was very good, marked by the seriousness and enthusiasm of the participants when participating in the training and seen from the participants' activeness during the Q&A and exercises.
4. Participants actively discussed in groups when practicing making simple teaching aids.
5. Participants were also active in participating, especially in the practice of each session of material presentation.

As the author has stated above, one form of assessment is through pretest and posttest. The posttest is carried out after the presentation of the material by all speakers. The posttest questions are also related to designing problem-based student worksheets. The results of the pretest and posttest of the participants are presented in Table 1.

Table 1. Result of pretest posstest

No	Pretest			Posttest			Kategori
	Rentang Nilai	Peserta	Persentase (%)	Rentang Nilai	Peserta	Persentase (%)	
1	80-100	0	0	80-100	19	61,29	Baik Sekali
2	70-79	5	16,13	70-79	10	32,26	Baik
3	60-69	11	35,49	60-69	2	6,45	Cukup
4	<59	15	48,38	<59	0	0	Kurang
Jumlah		31	100		31	100	

Discussion

Based on observations during the training activities, the participants' activities can be said to be enthusiastic during the activities. During the delivery of the material by the speaker, especially during the discussion and question and answer sessions for participants actively ask questions and express opinions and share teaching experiences related to the use of teaching aids from electronic waste as an implementation of SDGs in the Merdeka Curriculum in their respective schools.

Referring to the opinions expressed by several participants, information was obtained that basically there was already a desire and even some teachers had applied various teaching aids to make learning more interesting.

However, in general, its implementation has not been optimal and some haven't been realized. There are many obstacles they face, generally related to limited tools and materials, limited funds, and teachers' concerns that they could cause misconceptions if they were wrong in designing teaching aids. Based on the results of the written test assessment, especially the pretest scores as presented in Table 1. showed unsatisfactory results.

In general, the understanding of training participants regarding STEM ESD, global warming, and simple teaching aids is quite good, but still needs to be improved. From the pretest data, around 48.38% of almost half of the participants got poor scores, 35.49% got fairly good scores, and only around 16.13% of participants got good scores. This illustrates that there is basically a match between what the participants put forward and the scores they got. The

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limited understanding of participants regarding the creation of simple physics teaching aids in preparing certain learning is shown by the low test scores of workshop participants on training in creating teaching aids from electronic waste as an application of SDGs in the Merdeka Curriculum.

These results are very concerning and need our attention. Because ideally, learning is for teachers to be more creative and varied in using learning media, one of which is worksheets. Therefore, the training activities carried out are appropriate to improve the ability of science and physics teachers to develop teaching aids from electronic waste as an application of SDGs in the Merdeka Curriculum in order to increase teacher creativity and innovation in physics learning. So that learning objectives can take place.

CONCLUSION

Community service activities that have been carried out have encouraged an increase in teachers' understanding of making teaching aids from electronic waste as an implementation of SDGs in the Merdeka Curriculum. However, there are still obstacles such as the time for making teaching aids is only done by a few groups. In addition, the relatively long distance between participants makes coordination in making teaching aids relatively difficult. Therefore, for further activities, a WhatsApp group, zoom meeting is needed and sufficient literature or references are needed related to the design and creation of student worksheets by implementing various relevant learning models.

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