



The Training on Making Alternative Energy Kits to Support Independent Curriculum Learning for Physics Teachers in Nganjuk Regency

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ABSTRACT

This community service activity aims to train the making of alternative energy kits to support the learning of the Merdeka curriculum, especially for grade X phase E for physics teachers in Nganjuk district. Physics learning in the Merdeka Curriculum requires students to think critically and innovatively through a discovery process using a project-based learning model (PjBL). One of the applications of the PjBL learning model in physics is in the alternative energy material for grade X phase E. Based on observations, there is still a lack of supporting kits to support the chapter Alternative Energy. This Community Service activity is divided into several stages, namely: identification of problems and partner needs, Community Service preparation, Community Service implementation, training in making Alternative Energy kits, and evaluating the results of Community Service activities. A total of 60 physics teachers who are members of the MGMP (physics teachers association) of Nganjuk Regency became training participants. All participants were very enthusiastic in participating in the activity. Even from the results of the response questionnaire using Google Form which was distributed to participants, it appears that the training material provided is relatively new, very interesting, and inspiring. The results of the questionnaire also showed that the training material was relevant to the needs of teachers in schools. Participants hope that similar activities can also be improved with technology-based learning media training.

INTRODUCTION

In the era of the Independent Curriculum, learning-oriented toward developing student competencies is the focus. Teachers are required to deliver material and create meaningful learning experiences that are relevant to the times. One relevant learning approach is project-based learning (PBL), which encourages students to actively explore, innovate, and apply scientific concepts in real life.

Alternative energy, as one of the crucial global issues, is an important topic in physics learning. This topic is not only relevant to the learning objectives of the Merdeka Curriculum but also in line with efforts to build environmental awareness and sustainability in the younger generation. However, the implementation of learning about alternative energy often faces obstacles, such as limited facilities, learning resources, and teacher competence in preparing teaching aids that support interactive learning.

Nganjuk Regency, with many schools in urban and rural areas, faces challenges in implementing innovative learning. Most physics teachers lack the access or skills to create simple, effective alternative energy kits that meet the learning needs of the Merdeka Curriculum. In fact, this kind of teaching aid can help students understand the concept of alternative energy more concretely.

Therefore, an Alternative Energy Kit Making Training activity is needed for physics teachers in Nganjuk Regency. This training aims to improve teacher competence in



making and utilizing innovative, relevant, and independent curriculum-based learning aids. With this training, it is hoped that teachers will be able to organize more interactive and meaningful physics learning, and be able to instill awareness of the importance of renewable energy in students.

CASE STUDY

Based on the results of observations and interviews with the team on site, most physics teachers in Nganjuk Regency do not yet have practical skills in making simple but effective alternative energy demonstration tools or kits for learning based on the Merdeka Curriculum. Although alternative energy is an important topic, there are still few schools that utilize simple demonstration tools to support physics learning, especially those that can be integrated with project-based learning. In addition, the lack of training and assistance related to learning innovations makes it difficult for many teachers to apply a project-based approach that is relevant to the concept of alternative energy. Another gap that emerged was that many teachers understood the importance of alternative energy theoretically but did not have the experience or resources to teach this concept practically through demonstration tools or real projects. On the other hand, there has not been much research or reports documenting the effectiveness of alternative energy kit-making training to improve teacher competency in supporting the Merdeka Curriculum in the Nganjuk Regency area. These gaps indicate the importance of training specifically designed to meet the needs of physics teachers so that it can strengthen innovative and interactive learning in schools in Nganjuk Regency.

METHOD

The method applied in this community service is the application of learning technology and alternative learning media procurement technology for problems that arise among teachers. The activity begins with a discussion between the proposing team and partners to formulate the agreed priority root problems and determine the right solution. Based on the results of the discussion, the Community Service team prepares training activities, both in terms of materials and technical implementation.

As an effort to improve the learning performance and creativity of teachers, the proposer and partners agreed and justified the most likely solution is training in making alternative energy Kits to support the learning of the independent curriculum in the form of in-service activities that will be held at the Nganjuk Regency Education Office targeting Physics Teachers throughout Nganjuk Regency who are members of the Physics MGMP (Physics Teachers Association). In the implementation of Community Service activities, the approach method offered is participatory, namely the proposer and partner teams are proactively involved in each activity. Through a touch of creativity in utilizing used goods around, a simple alternative energy Kit is produced that can support learning that implements the independent curriculum so that, in the end, it will be able to improve teacher performance.

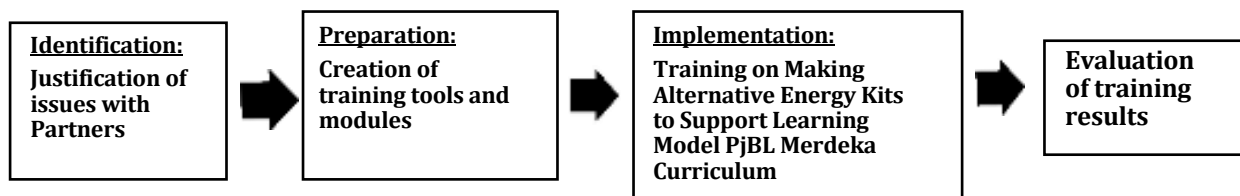


Figure 1. Flowchart of the stages of the Alternative Energy Kit Making Training activities.

In more detail, the work procedures (activity stages) carried out in the training are: (a) identification of problems and needs of Partners; (b) discussing the materials to be selected and designing Alternative Energy Kits; (c) implementing Community Service training on making Alternative Energy Kits and evaluating the results of Community Service activities. The participatory approach is realized through intensive coordination between teachers at partner schools and the team of lecturers implementing Community Service activities in planning and implementing all training activities. The training materials for making Alternative Energy Kits will be provided by the Community Service lecturer team. The participation of teachers as partners in the implementation of this Community Service intensively plays an active role from the preparation stage (beginning) of the activity to the end of the activity. In more detail, the participation of partners in this Community Service can be described as: (a) as the subject of program implementation (source of information on problems that become obstacles and barriers in learning); (b) directly involved together with the implementing team to justify priority problems and the best solutions that are most likely to be implemented in schools through teachers who act as implementing subjects in implementing alternative solutions to problems that have been agreed upon.

IMPLEMENTATION

The Community Service training activity was held on Saturday, July 20, 2024, and took place in the Hall of SMAN 1 Nganjuk. The training participants were 60 Physics teachers who were members of the MGMP Nganjuk Region. The training materials provided were in the form of PjBL model learning in the Merdeka Curriculum, the concept of alternative energy, and a discussion of examples of PjBL-based alternative energy LKPD (student worksheet). In explaining the concept of alternative energy, the speaker said that alternative energy is not only limited to solar cells but can also come from materials that are easily obtained in everyday life. For example, used cooking oil which can be used as alternative light energy to replace candles. After the material was given, continued with the practice of making the Kit. Participants were also given the opportunity to try the Kit that had been made in groups. The alternative energy kit uses simple and easily obtained materials, such as cooking oil, stove wicks, copper wire, margarine, beeswax, and ordinary candles. After the practice session, it was continued with a discussion session. In the discussion session, the average participant said that the practicum using this alternative energy Kit was quite easy to practice for high school students, but from the safety aspect, it still needed to be maintained. Furthermore, participants were given the assignment to create an alternative energy LKPD with the PjBL model, which was collected on Google Drive.



Figure 2. Implementation of Alternative Energy Kit-Making Training Activities.

As an evaluation material for the training activities that have been carried out, the Community Service team distributed a Google Form link for the participant response questionnaire to members of the MGMP Nganjuk Region who participated in the training activities. There were 15 questions that had to be answered by the participants, such as whether the training material was well-structured, whether this training helped teachers in developing kit and LKPD for Alternative Energy, and whether this training supported the improvement of teacher professional development. These questions were scored 1 for strongly disagree, 2 for disagree, 3 for agree, and 4 for strongly agree, except for 3 questions that asked for the opinions of the training participants regarding their impressions of the training held, things that needed to be improved, and other types of training desired by the participating teachers.

RESULT AND DISCUSSION

The following table presents the results of the training response questionnaire, which includes 12 questions:

Table 1. Results of the Training Participants' Response Questionnaire to Training Activities

No.	Statement	Percentage of Response (%)			
		Strongly disagree	disagree	agree	Strongly agree
1	This training is useful for me	5	0	9	86
2	The training materials are well-structured	0	0	36	64
3	The training materials are relevant to the	0	0	82	18
4	needs of teachers in schools	0	5	14	82
5	The delivery of training materials is	0	0	23	77
6	communicative	0	0	5	95
7	The delivery of training materials is interesting	0	0	27	73
8	The speaker masters the training materials well	0	0	23	77



No.	Statement	Percentage of Response (%)			
		Strongly disagree	disagree	agree	Strongly agree
9	The training materials help me in	0	5	23	73
10	Developing LKPD (student worksheet) on chapter of Alternative Energy	0	0	14	86
11	The training materials help me in	0	0	23	77
12	Developing Kit on Alternative Energy	0	0	5	95

Table 1 also shows that this training received a very positive response from the participants. Almost all questions in the questionnaire were answered by the participants by giving a score of 3 and 4. Although there were some who gave a score of 1 and 2, in general, this training received a positive response, so it can be said that this community service activity has been successfully held. Impressions during the training: most teachers participating in the training gave positive responses. For example, a comment from one of these teachers: "Material that we usually consider complicated, and complex can be solved into something simple." Or a comment from one of these teachers: "Interesting, simple, and easy to apply." Even the participant's request was also stated in the response questionnaire, "Hopefully, if there is another training from Unesa, a practicum will be carried out for teachers, and there will be a practice for technology-based learning media training". This request can be followed up and responded to in future activities.

CONCLUSION

Community Service Training Activity for Making Alternative Energy Kits to Support Independent Curriculum Learning for Physics Teachers in Nganjuk which was held at the SMAN 1 Nganjuk Hall on July 20, 2024, was successfully held. The participants who took part in this activity numbered 60 people and were physics teachers who joined the Physics Teachers Association Nganjuk Region. In this training activity, the participants not only received material about alternative energy and how to make the Kit, but also tried the Kit directly. At the end of the event, the Community Service team distributed a Google Form link containing a response questionnaire to the participants. This questionnaire is useful as an evaluation material for the activity. The results of the response questionnaire showed that most participants responded positively to this activity, so this Community Service activity was successful. In the future, similar activities, namely making Kits, can also be carried out again, but with different materials, for example, making a simple electric Kit. This Alternative Energy Kit training could be attended by different participants.

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